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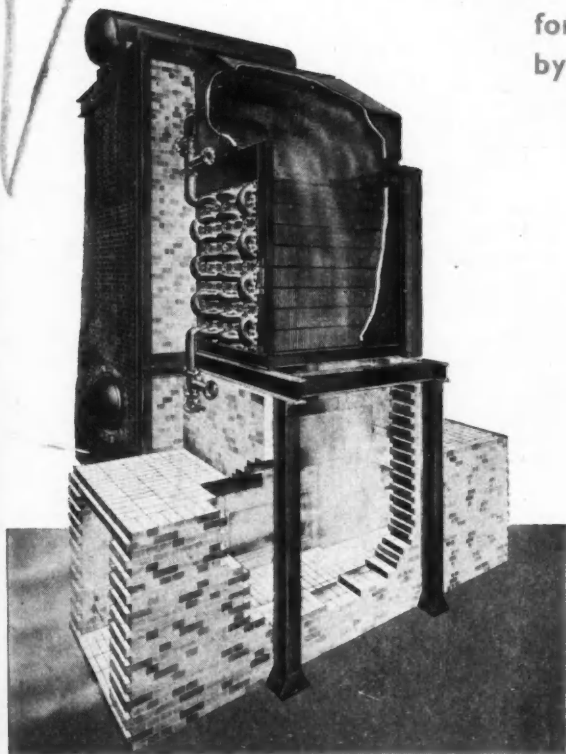
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VOL LXVI

15 MARCH 1952

No 1705

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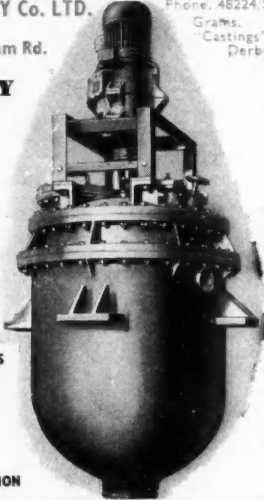
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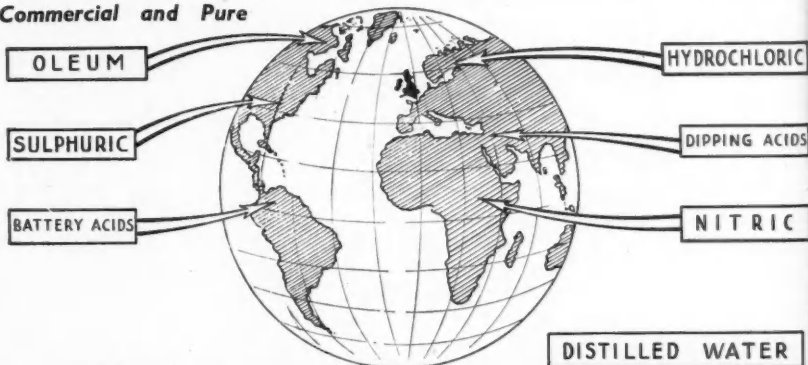
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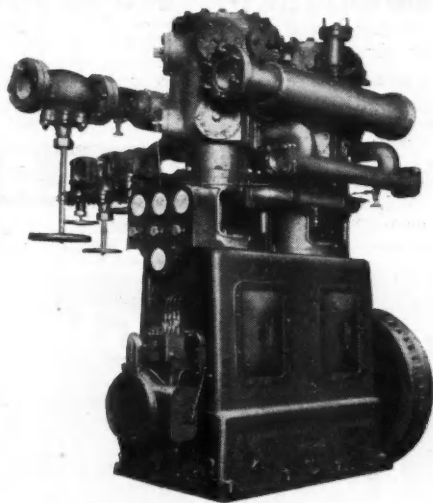
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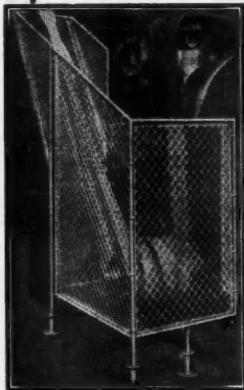
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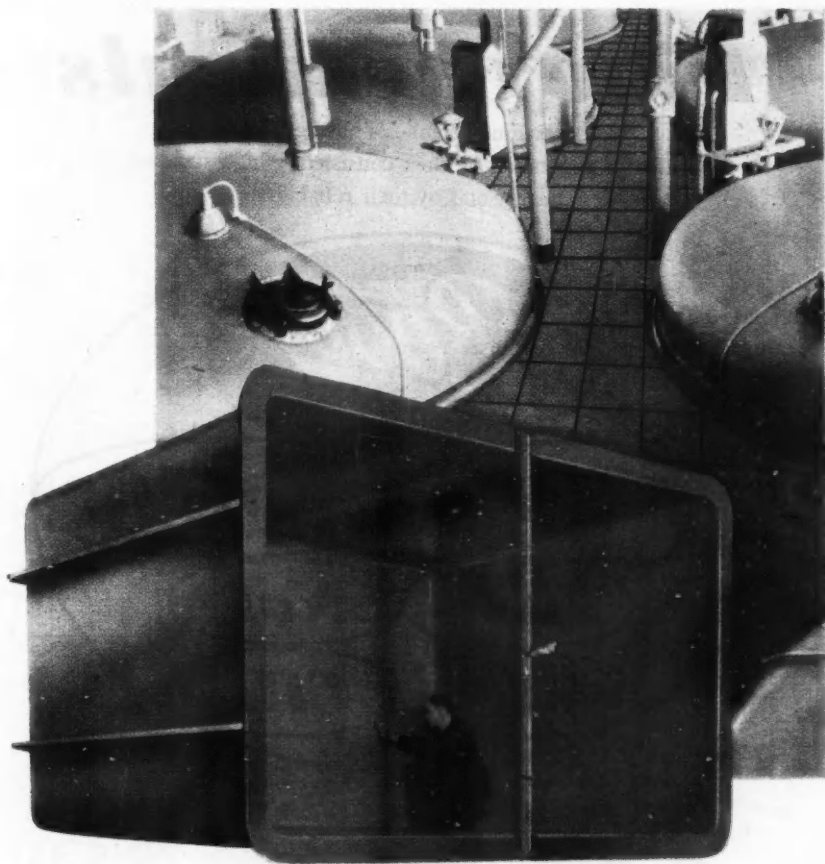
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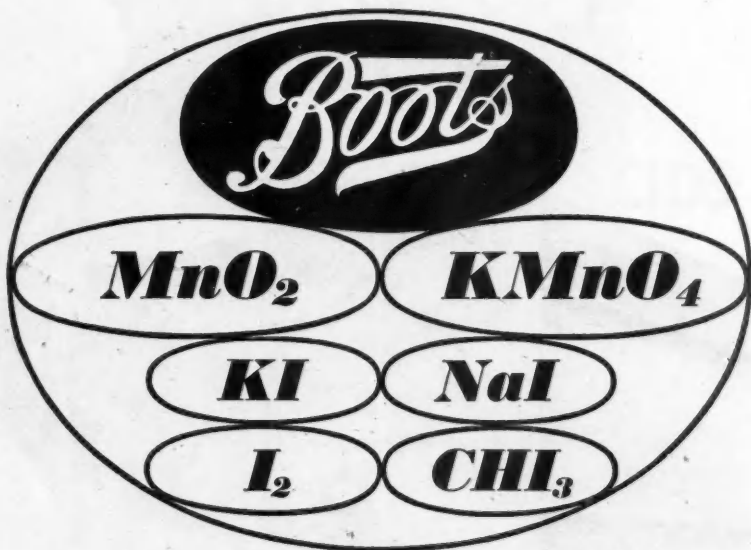
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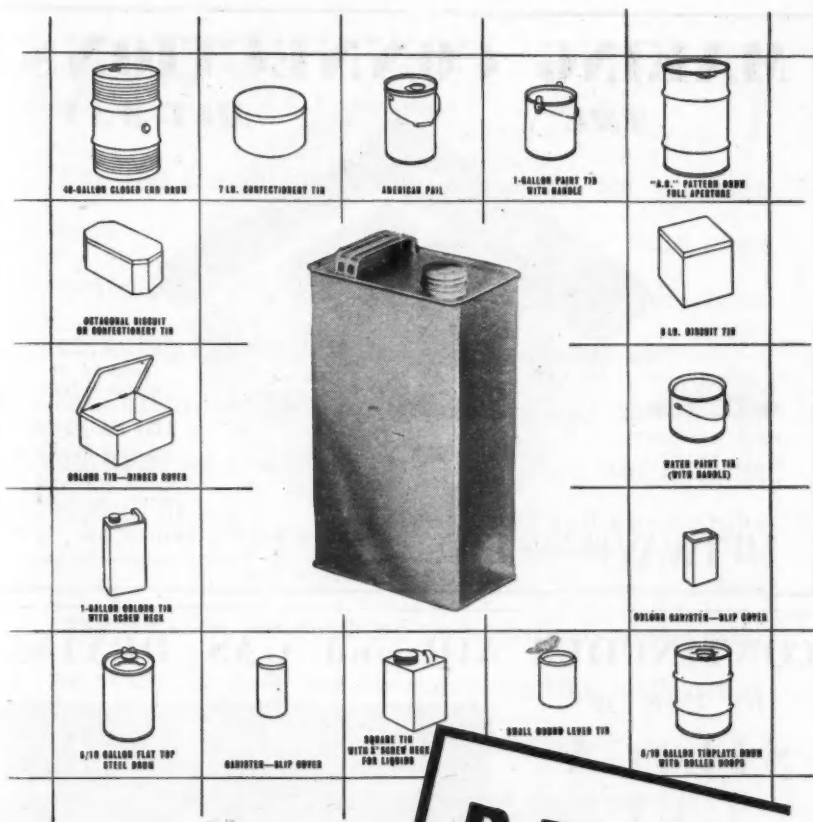
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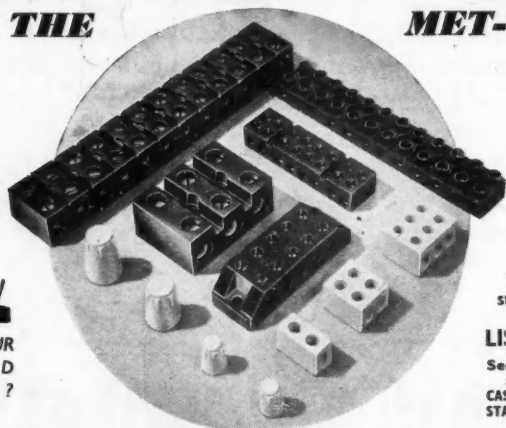


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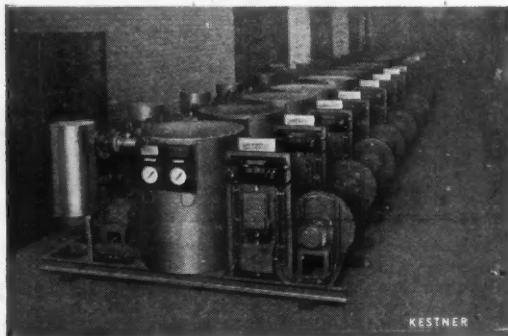
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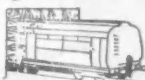
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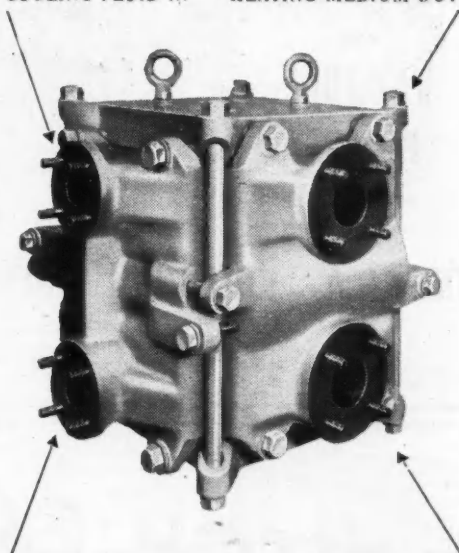


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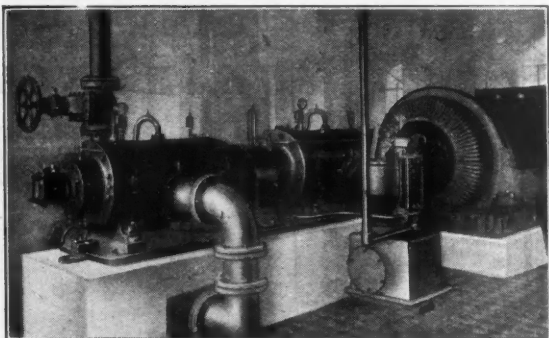
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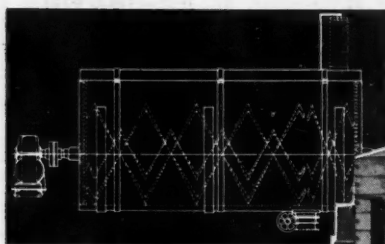
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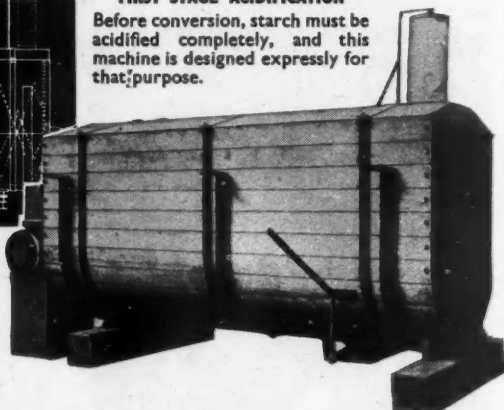
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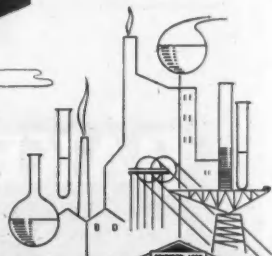
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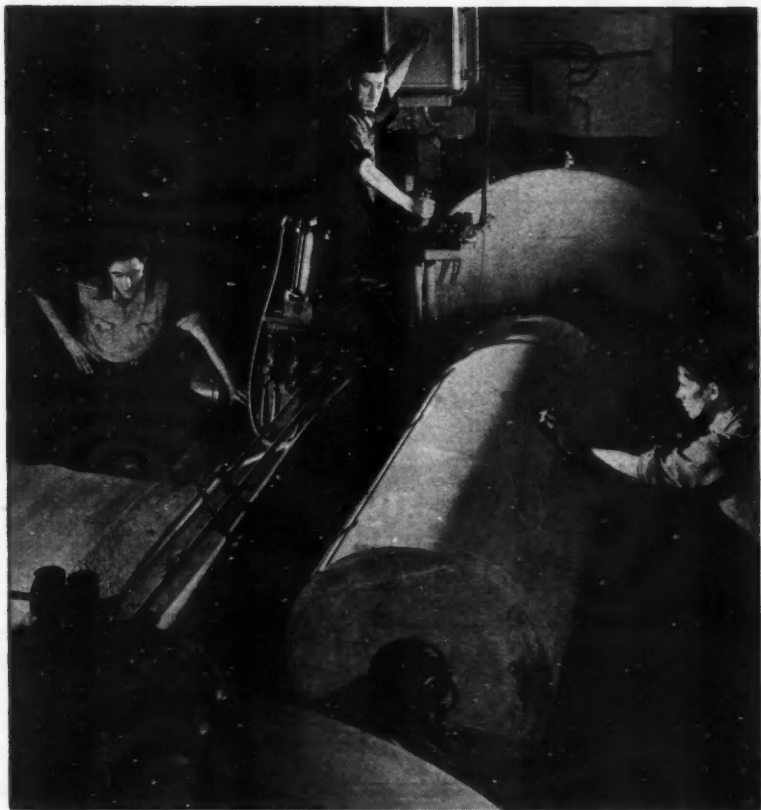
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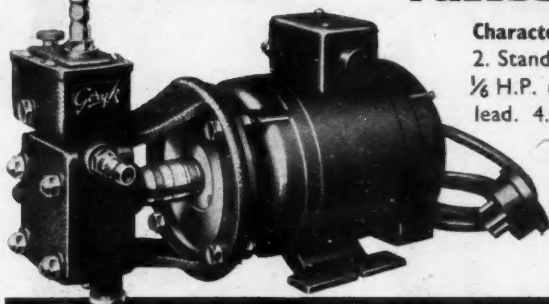
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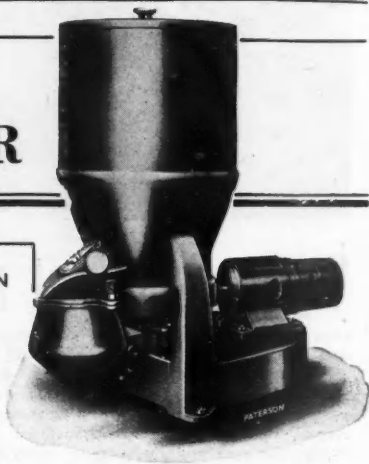


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Volume LXVI

15 March 1952

Number 1705

Mr. Butler's Challenge

WHEN Mr. R. A. Butler assumed office as Chancellor of the Exchequer just over four months ago his duty was painfully clear, for Britain was heading at suicidal speed towards bankruptcy. Unpleasant and difficult as the task was, Mr. Butler faced up to his responsibilities and he lost no time in tackling the inflationary danger by the funding of Treasury Bills and the restriction of bank credits. Other measures were also introduced such as reductions in governmental spending and restrictions on imports and on Tuesday the Chancellor put forward proposals intended as the third and final stage of his programme for solvency. Mr. Butler's main problems were to check consumers' expenditure in support of the curtailment of imports and the diversion of goods for defence and for export, to create an incentive to work and to encourage saving. By slashing the food subsidies, finding income tax concessions and raising the Bank Rate he has boldly attempted to solve them all.

The Budget is an extremely complicated one and it will be some time before we will be able to pass judgment. At first sight, however, it seems doubtful whether he has done sufficient to offset fully the inflation of purchasing power which is bound to be caused by the

reduction in imports. That depends on the course of the trade recession and the trend of wages, and neither are foreseeable. It also depends on what effect the increase in the Bank Rate will have, and this too is extremely difficult to foretell. One thing only is clear and that is that Mr. Butler has tried hard to bring home the realities of the crisis and to restore confidence in the pound. Whether he achieves his objects or not depends on a great number of factors—probably the most important being the way in which it is received. Britain must produce more of certain types of goods and she must produce them quickly and cheaply. It must be realised that to make a rise in the cost of living an excuse for a rise in wages is to put the cart before the horse. Every effort must be made to prevent further increases in the price of coal, gas, electricity and transport, for these are big factors in production. The tendency to overstaff and underwork must be resisted and drastic economies in administration introduced in nationalised industries.

Mr. Butler's Budget is provocative and no doubt it will come under fire from many quarters. Labour will criticise the reduction in food subsidies and other proposals and industry will not be entirely happy about the rise in interest rates and the new Excess Profits Levy.

A certain amount of temporary unemployment is bound to develop although it would be unfair to blame all of this on the Chancellor. There are a number of details which will have to be worked out and slight alterations or modifications are likely. The Budget as a whole is a welcome one, however, and everyone should respond to Mr. Butler's challenge

with good will and determination. By refusing to follow the pattern set by his predecessors—one of higher expenditure and higher taxation—Mr. Butler has given the nation encouragement and hope. For one thing, the four per cent bank rate should make the foreigner think better of our currency and tend to reduce the price of imports.

Notes & Comments

Antioxidants

THE publication of another of the papers from the 'Use of Chemicals in Foods' Conference last autumn is to be applauded (Chemistry & Industry, 1952, 9, 178). The Society of Chemical Industry has minimised the delay between platform and print for this theme of international importance. Dr. C. H. Lea's comprehensive survey of antioxidants that inhibit degrading oxidation processes will no doubt be read with even greater interest abroad than here, for in Britain the use of antioxidants is still forbidden by Ministry of Health regulations though in some other countries, notably in the United States, a position of selective permissibility has been reached. In hotter climates than ours and in countries where large-scale natural fat production creates a significant storage problem, there is perhaps a stronger case for regarding the

use of chemical antioxidants as 'in the national interest.' A point made strongly by Dr. Lea is that many foods contain natural antioxidant substances and substances that synergise antioxidant actions; also, the smoke-curing of fish and meat owes some part of its preserving function to the deposition of phenolic antioxidants. The problem posed by the deliberate addition of chemical antioxidants is a problem of extension rather than one of new venture. In considering whether in future such additives should be permitted within fixed limits, a distinction must be drawn between substances that are already consumed by the public in foodstuffs and those that would, so far as is known, be quite new trace introductions into human diet. A point of some relevance that arose in the discussion is that there may be more toxic danger in the consumption of oxidised fat than in consuming fat protected from

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oxidation by the addition of an antioxidant. Despite the current tendency to question chemical additions to foodstuffs, there would seem to be a well justified case for permitting in this country the use of a few of the safer antioxidants. Each such substance can be considered on its merits. A general prohibition is not logical.

Plant Growth Interruption

WHEN the unique growth-inhibiting property of maleic hydrazide was announced three years ago, it then seemed that its usefulness might be limited to luxury or decorative purposes in the garden or small estate, but time has now widened the potential scope of this new agricultural chemical. It is now fairly certain that maleic hydrazide inhibits normal plant growth by decreasing the rate of respiration and also retarding cell division; it is, in fact, an antagonist to the natural plant auxins or hormones. Results of using the substance as a weedkiller have been very variable; inhibition rather than control for a considerable period has been achieved and it seems doubtful whether maleic hydrazide can seriously compete with the better-known selective or hormone-type weed killers. As a preventative of sprouting in stored crops, e.g., onions, carrots, potatoes, etc., very encouraging progress has been shown. A pre-harvest spray has been found sufficient to eliminate the risk of sprouting under normal post-harvest storage conditions. Another hopeful development is the use of maleic hydrazide to reduce the runner-production of strawberry plants during their first year, a common and yield-reducing problem with certain varieties. The idea that it could be used to retard fruit blossoming until risk of frost has past is still somewhat speculative. This can be accomplished very effectively with bramble fruits such as the blackberry or raspberry, but with these there is little danger of frost damage to blossom. With tree fruits the blossom opens with a relative independence to vegetative growth so that maleic hydrazide's inhibiting properties do not directly affect the natural timetable of blossoming; neither sprays nor injections have so far been success-

ful. Maleic hydrazide may find a significant use as an addition to hormone sprays employed to reduce the pre-harvest drop of tree fruit. It has been found that these substances, though successful, increase the rate of fruit respiration and this leads to serious storage losses later. The addition of maleic hydrazide, or its later use as a separate spray, will tend to balance the respiration-increasing effect. However, horticulturists may cynically reflect that this is yet another case of one spray needing a second.

Catalysis in the Car?

CATALYSIS as well as combustion may take place in car and aeroplane engines of the future. Briefly expressed, the idea now taking a research shape in America is to bond a group of catalytic minerals into the piston or cylinder head. The catalysts are selectively chosen for their capacities to catalyse specific combustion reactions and also to modify specific hydrocarbons in mineral oil. Tests with catalytic pistons are said to have given most promising proof that the principle is sound—the performance of petroleum rated at 76 octane was equivalent to that of a 100 octane fuel. Also, carbon deposition was remarkably reduced, much less deposition resulting from 40 hours' operation than is normally obtained in one hour's running of an aeroplane engine. The catalysts used are acidic ores and minerals, related in theory to the earth substances which have acted as natural catalysts in the geo-chemical formation of light hydrocarbon oils. A woman chemist and research specialist on catalysis, Sophia Berkman, has developed the idea. If it survives further research testing, the implications for the motor and oil industries are very considerable. The current tendency to produce higher and higher octane fuels would receive a check and low-compression engines could be widely introduced. There is unlikely to be a cost problem in producing the catalytic piston or cylinder head. The raw materials required are cheap and the entire cost of preparing them and incorporating them will amount at the most to no more than a small percentage of engine manufacturing cost.

Potash Production in Europe

Plans to Increase Output in France and Germany

SUBSTANTIAL gains in output of potash were recorded in East and West Germany last year. Production in the Soviet zone rose by 5.5 per cent. In the absence of official output figures, the 1950 production may be estimated at 1,200,000 tons of K_2O , so that the 1951 output probably exceeded 1,265,000 tons. Potash production in the German Federal Republic last year advanced from 911,000 to 1,099,000 tons of K_2O , due mainly to the reopening of several mines.

In France on the other hand, production declined by 30,000 to 998,000 tons, owing to the temporary closing of the Amélie mine. As, however, output in Spain showed an upward trend during most of last year, the European potash production (excluding Poland and the Soviet Union) may be put at 3,545,000 tons, compared with 3,310,000 tons in 1950 and 2,346,000 tons in 1938.

Eastern Germany

No difficulty was experienced by the principal producers in disposing of the growing output. A substantial proportion of the East German production goes to eastern countries, but potash has been shipped also from East Germany to the Scandinavian countries and other western destinations. The more important potash works in the Soviet zone, especially in Thuringia, are operated by Soviet Corporations under the direct control of the Russian authorities. In these as well as in the 'publicly owned' potash mines under the control of the Soviet zone Government steps are being taken to increase production further. A target production of 2,000,000 tons of K_2O has been mentioned for the end of the current Five Year Plan, that is, for 1955.

Production in West Germany last year advanced more rapidly than in the eastern part of the country, and it is hoped to score further substantial gains this year when several more mines are to resume operations. Of the major producers Wintershall, Burbach and Kali Chemie have announced expansion plans. A new potassium chloride works is to be put into operation next month.

The entire potash exports from West Germany are available for western countries.

Domestic consumption, however, has increased greatly in recent years and may this year exceed the 700,000 tons reached in 1950/51, so that the exportable surplus is unlikely to exceed 400,000 tons, compared with about 650,000 tons available from East Germany.

In France the slight fall in production last year did not interfere with the 10-year development programme which provides for an increase in potash production to at least 1,200,000 tons in 1957. French home consumption in 1950/51 amounted to 425,000 tons and is likely to show a further increase this year. Nevertheless, France still surpasses West Germany as a potash exporter; the exportable surplus during the current fertiliser year may be estimated at about 500,000 tons. When the Amélie mine has been modernised and re-equipped and the Mines Domaniales, as proposed, undertake the exploitation of the deposits at Blodelsheim, French potash exports will, after the temporary setback of last year, increase substantially.

The potash market is mainly European as American production is sufficient to meet the bulk of requirements in the U.S.A. and also in Canada. The only other major consumer outside Europe is Japan. Bulk of the French and German fertiliser potash exports goes to Britain, Holland, Belgium and the Scandinavian countries. Consumption in these markets has so far absorbed the increasing production in Germany and France, and the continental producers believe that the market is sufficiently flexible to absorb the expected further increase.

It remains to be seen, however, how world market prices will be affected by the proposed utilisation of the newly-discovered potash deposits in Yorkshire and a resumption of potash extraction from the Dead Sea.

Venezuelan Discovery

Discovery of bauxite fields in Venezuela containing an estimated 2,000,000 tons of high-quality aluminium ore has been officially announced. Experts from the Venezuelan Ministry of Mines located the fields north of the village of Upata in Venezuelan Guiana.

Electron Micrographs in Colour

New Technique Worked Out at Utah Agricultural College

In response to numerous requests for an elaboration of the summary published in *THE CHEMICAL AGE*, 65, 863 (1951), on the subject of electron micrographs in colour, we are publishing a transcription of the paper summarised, in full. It was read to the 9th annual meeting of the *Electron Microscope Society of America* on 8 November, 1951, its authors being G. W. Cochran, of the *Utah State Agricultural College*, and J. L. Chidester, of the *Dugway Proving Ground, Utah*.

COLOUR being a property confined to visible light, there is of course, none in an electron beam. Nonetheless, it is possible to produce transparencies and prints of electron microscope pictures which reveal the details of the specimen in many brilliant colours. The production of these colour pictures is an application of the amazing discovery of R. D. Bensley, that colours could be produced in photographic emulsions by the photographic development of exposed colloidal silver chloride lying within the emulsion. The transparencies can be made on an ordinary lantern slide plate, using ordinary photographic chemicals. No dyes or colouring materials of any sort are used in the processing. The colours arise within the emulsion, through the action of the particles of colloidal silver in filtering out certain wavelengths of visible light while transmitting other wavelengths.

Application of Colour Process

This colour process may be applied to any electron microscope picture in any dark-room. The starting point for the process is the usual developed and fixed image of the microscope negative. There are five main steps in the process:—

1. The production of a black and white image on the medium lantern slide plates.
2. Resensitising the black and white printed plates.

3. Exposure of the resensitised plates to light.

4. Colour development.

5. Fixing, washing, and mounting of colour transparencies.

All solutions used are controlled at 20°C.

1. Contact prints are made on medium lantern slide plates from black and white

positives or negatives using normal printing times. The exposed plates are developed in Decktol developer to yield images of normal contrast and density (Decktol—distilled water), and the developed plates are fixed in plain hypo for at least double the clearing time (1 part hypo to 4 parts distilled water).

The cleared plates must then be hardened in two 5-minute changes of a weak potassium alum solution. (1½g. potassium alum/l. distilled water). They are next washed in three 5-minute changes of distilled water, and in running tap water for 1-2 hours.

Immersed in Silver Nitrate

2. For the resensitising of the black and white printed plates, the plates are immersed in 1.7 per cent silver nitrate solution for 5 minutes, then rinsed for 20 seconds in tap water. A bright yellow safelight must be used for the remainder of the processing. After rinsing, the plates are immersed in 10 per cent ammonium chloride solution for 10 minutes. The emulsion of the plates takes on a whitish appearance as the silver chloride is formed within it. The plates are washed for 20 minutes in tap water.

They are then dried if they are to be exposed through a mask. If masking is not used, the wet plates may be exposed to light and the colour development continued without any drying.

3. The exposure of resensitised plates: Masking usually gives a greater variety of colours in the transparency. A mask which is positive with respect to the black and white image of the resensitised plates should be used. Kodolith ortho thin base film type 2 makes a very satisfactory mask. This film is exposed through its base to a negative to produce a laterally reversed positive mask which is then registered (emulsion to emulsion) with the resensitised plate for exposure. The masking procedure is optional; very satisfactory transparencies can be produced without masking.

The resensitised plates may then be exposed through the registered mask in a printing frame, or, if masks are not used, they may be exposed either dry or while still wet from the wash water of the preceding step. The optimum exposure time will vary

with the amount of colloidal silver chloride present in the emulsion. Plates are commonly exposed 20-40 seconds with No. 2 photo-flood lamps at a distance of two feet.

4. For colour development, the exposed plates are developed for three minutes in a glycine developer consisting of glycine—1 g., sodium sulphite—10 g., distilled water—1,000 ml., 1.7 per cent silver nitrate solution—2 ml. (added when developer is to be used).

Odell's Physical Developer

The remaining development may be carried out using Odell's physical developer in a white light so that the colours may be observed as they appear. First, the most transparent areas of the plate appear light yellow. As the development proceeds these areas change to orange and finally to red at optimum development.

At this point there is usually a whole range of other colours. The colours which develop are determined primarily by the original density values of the black and white print. The areas of very great density will be black; as the density decreases the corresponding colours occur as dark blue, light blue, greenish-blue, green, yellow-green, yellow, orange, and red.

The plates are fixed for five minutes in a hardening type fixing solution to stop the colour development. They are then washed for 20 minutes in tap water, and dried and mounted with cover glasses.

A positive transparency of, say, zinc oxide smoke taken at a magnification of 25,000, and given colour treatment, will show the crystals green with the background red. However, a conventional negative transparency, as most electron micrographs of metal-shadowed objects are, show the crystals as red and the background as green. Obviously these colours do not represent the true colours of the specimen.

One of the greatest advantages of using this colour process is that the edges of the bodies are clear-cut and distinct, far more so than with their conventional black and white counterparts. This is due to the fact that the Fresnel fringes bordering each particle are reproduced as a colour which is distinctly different from either the colour of the particle or the colour of the background. The Fresnel fringes, for instance, could appear as yellow while the background is blue and the bodies are red. This pheno-

menon gives the colour pictures a crispness which is lacking in conventional electron micrographs.

A second advantage lies in the fact that the eye can detect differences in colours more easily than it can in shades of grey. The final colour transparencies show a range of variation for the greys from yellow, through orange, into red, which is easily detected. When black and white positives or negatives of the same picture are examined, the density differences accounting for this very noticeable colour variation may be so slight as to be scarcely detectable. These transparencies may also serve as the starting point for colour prints.

Present achievements in the development of the colour process should not, of course, be taken as ultimate. Far better results should be possible when all the factors which affect the process are better understood. Certain artifacts, for instance, appear occasionally; these cannot be eliminated until their cause is understood. They should not, however, lead to misinterpretation, because one can always check the black and white negative or positive used as the starting point to establish the presence of colour artifacts.

If this process is properly applied it does not result in the loss of any specimen details; rather it enhances the details and the crispness of the micrographs. Besides that, all will agree that these colour electron micrographs are pleasant to look at.

Bauxite Ore Enriched

A NEW process for beneficiating Arkansas bauxite ores that have a high iron content—ores that up to now have not been used for commercial production of abrasives or alumina—is described in a Bureau of Mines report released recently by the U.S. Secretary of the Interior. The Bureau made this investigation to find ways of using the wasted high-iron fraction of the bauxite which is rendered unsuitable for future use by present treatment methods. The new method produces both an abrasive fraction and a high-iron fraction which can be used for alumina production. It consists of a 10-15 minute low-temperature oxidation roasting of the ore, followed by high-intensity magnetic separation of a high-iron fraction. Recovery of the alumina is said to be 98 per cent.

Review of Coal Tar Technology

Work Done from January-June, 1951

COAL-TAR technology covers a wide range of subjects, and the work summarised by the latest review of the subject, dealing with the period January-June 1951, is correspondingly wide in scope. The review is obtainable from the Coal Tar Research Association, Oxford Road, Gomersal, near Leeds, Yorkshire (price 5s.). It is divided into two sections—coal tar and coal tar products, and general chemistry and chemical technique.

In the first section is mentioned the new process for the production of phenol and acetone now being exploited in the U.S.A. on an industrial scale—the catalytic interaction of benzene and propylene to form cumene, which is then oxidised to its hydroperoxide which, on hydrolysis, yields phenol and acetone. According to a patent of the Distillers Company (B.P. 649,286), the difficulty of removing phenol from the products obtained on the decomposition of the hydroperoxide is overcome by water extraction at 50-100°C., subsequent to the removal of the acetone by distillation.

Two patents refer to the preparation of benzene hexachloride. According to the first (Solvay), a solution containing 14 per cent benzene hexachloride, claimed to have 'remarkable insecticidal properties', is prepared by chlorinating benzene in the absence of oxygen under u.v. light, at an initial temperature of 6°C., gradually decreasing to 1°C. (U.S.P. 2,524,970). The second, to I.C.I. (B.P. 607,326) claims that chlorination in actinic light and in the presence of an aromatic disulphide is advantageous.

Determination of Benzene

A method for the determination of benzene in coke-oven gas, claimed to be suitable for estimating the efficiency of benzene scrubbers on coke-oven plants, is described in a Czech journal (V. Prochazka and J. Klima, *Chem. Abs.*, 25 November, 1950, 44, 11064; from Paliva, 1950, 30, 192-4). A minimum of 300 litres of rich gas or 2,000 of lean gas is needed for the determinations, as these are based on the adsorption of benzene on activated carbon. Naphthalene or

a small quantity of higher hydrocarbons do not interfere.

The improved purification of refined naphthalene is the subject of a British patent to the North Thames Gas Board (651,154). Refined naphthalene obtained by treatment with sulphuric acid followed by sublimation often tends to turn brown on standing. It has now been found that this discoloration is entirely avoided if the refined naphthalene is passed molten through a bed of silica or ferric oxide gel of 30-100 mesh size at between 80 and 100°C. The silica gel is washed free of sulphate and dried at 130-140°C. before use. The adsorbent can be used to treat up to twenty times its weight of naphthalene, after which it can easily be revived by washing with a suitable solvent.

Fluorescence Test

It is pointed out that naphthalene which may darken on standing does not fluoresce in ultra-violet light, whereas material which has no tendency to discoloration fluoresces brightly. This provides a means of determining whether a given batch can be submitted with advantage to the above treatment.

A new technique for the determination of 2-nitronaphthalene is the measurement of the blue fluorescent light intensity produced when the sulphonated and reduced sample is irradiated with u.v. light of 365 μ m. The light from the 1-isomer is filtered out (F. L. English and J. W. Eppert, *Anal. Chem.*, May, 1951, 23, 717-20).

The recovery of pure anthracene is described in an Italian patent (Ital. P. 444,330). The vapours distilling from tar at 250°C. are cooled to 150° and mixed with 2-furaldehyde. The mixture is then further cooled and centrifuged. The dry product is stated to contain 65-70 per cent crude anthracene, which is purified by recrystallisation from the same solvent.

A method of preparation for 9,10-dimethyl anthracene, a compound of interest in biological studies, which is regarded as much superior to those earlier recorded in the literature, is a four-step synthesis involving formylation of anthracene to 9-anthraldehyde, reduction of the latter to 9-methyl

anthracene, and the repetition of these two reactions on the 9-methyl anthracene obtained (Buu-Hoi and N. Hoan, *J. Org. Chem.*, June 1951, **16**, 874-81).

In a study of the reduction of aromatic hydrocarbons with lithium aluminium hydride, it has been found that anthracene yields 9:10-dihydro-anthracene, and that phenanthrene yields almost entirely unchanged hydrocarbon. It is concluded that a truly aromatic (benzenoid) nucleus is not reduced by this reagent and that in the case of anthracene, the effect is associated with its *meso*-reactivity (I. Goodman, *J. Chem. Soc.*, March 1951, 846-7).

Polycyclic Aromatic Compounds

A review of recent theoretical and experimental work on the structure and properties of polycyclic aromatic compounds has also been published; it includes a discussion of reactive centres, reactivity of double bonds and eliminations from dihydro-aromatic systems. Current theories relating carcinogenic activity to chemical constitution are also surveyed (G. M. Badger, *Chem. Abs.*, 10 April, 1951, **45**, 2927; from *Roy. Australian Chem. Inst. J. and Proc.*, 1950, **17**, 14-30). The energies of the ground state and the lowest excited state of a number of condensed ring hydrocarbons, including anthracenes and pyrenes, have been calculated in another paper (G. R. Baldock, *Proc. Phys. Soc.*, 1950, **63A**, 585-91).

The influence of heterocyclic nitrogen compounds on the stability of petroleum fuel oil in storage has been investigated by Thompson *et al.* It was found that pyrroles promote gum formation to a greater extent than do substituted pyridines. With indole and 2,5-dimethylpyrrole an unexpected improvement in the colour of the oil occurred. A sensitive test for the qualitative detection of compounds containing the pyrrole nucleus is described in the same paper (*Ind. Eng. Chem.*, April, 1951, **43**, 935-9).

Aromatic amines can be stabilised against discoloration during storage by the addition of small amounts of the product formed by the action of P_2S_5 and a polyalkyl phenol (U.S.P. 2,510,849). The reaction product of 2,4-xyleneol with a nonaldehyde in presence of an acid catalyst is a 1,1-bis-(2'-hydroxy-3',5'-dimethyl)-nonane. Such compounds are claimed by I.C.I. as antioxidants for natural and synthetic rubbers (B.P. 651,369).

According to an advertisement in *Chemical & Engineering News*, U.S. Industrial Chemicals Inc. claim a new method of preparing tartaric acid by the oxidation of maleic anhydride (from coal tar benzole) in the presence of a little tungstic oxide as catalyst (C. & E. N., 19 March, 1951, **29**, 1109).

In the second section of the Review (General Chemistry and Chemical Technique), more evidence is reported in support of the ionic mechanism of reactions on cracking catalysts. Blue and Engle have investigated reactions of hydrogen exchange between *cis*-decalin and tetralin as donors, and 1-butene and *iso*-butene as acceptors, under mild conditions when little cracking occurs. The catalysts were alumina-silica of various compositions, those with 60 to 90 per cent silica being most active for hydrogen transfer. This is similar to the optimum composition for cracking. A hydrogen ion transfer is suggested by this and other evidence. Work with C-¹⁴-labelled butene indicated that the main catalyst deposit comes from the hydrogen donor molecules (R. W. Blue and C. J. Engle, *Ind. Eng. Chem.*, February, 1951, **43**, 494-501). Experiments on the hydrogen-deuterium exchange over the same catalysts demonstrated that the catalysts with 60 to 90 per cent silica were least active; the mechanism for this reaction must therefore be different from the hydrogen exchange reaction. (U. C. F. Holm and R. W. Blue, *Ind. Eng. Chem.*, February, 1951, **43**, 501-15).

Friedel-Crafts Reactions

The apparent inactivity of antimony trichloride in the Friedel-Crafts reactions has been shown to be due to the formation of stable complexes between aromatic hydrocarbons and SbCl₃. Where complex formation is not possible the activity is comparable with that of BiCl₃ and SnCl₄ (G. Cauquil and H. Barrera, *Bull. Soc. Chim., France*, January/February, 1951, 84-7).

Alkylation reactions in the presence of freshly fused zinc chloride and a trace of added HCl have been reported in a Russian paper. Benzene, toluene, naphthalene and phenol are among the compounds studied (A. B. Kuchkarov and I. P. Tsukervaink, *Chem. Abs.*, 25 January, 1951, **45**, 567; from *J. Gen. Chem. S.S.S.R.*, 1950, **20**, 458-61).

Russian workers have also advanced reasons for contradicting the general assumption that the poisoning of hydrogenation-

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tion-dehydrogenation catalysts takes place by the blocking of active centres. They support the view that this is due to the removal of dissolved hydrogen which is an essential promoter. The strong poisoning effect of H_2S may be explained by a chain reaction of the type $H_2S + H \rightarrow H_2 + HS$; $2HS \rightarrow H_2 + 2S$; $S + H \rightarrow HS$, etc. Thus one molecule of H_2S can remove a great number of hydrogen atoms from the catalyst. High temperature and vacuum, factors which favour removal of dissolved hydrogen, reduce catalyst activity. The theory is supported by results from the reduction of 1-ethyl-1-cyclopentene during which platinum or charcoal catalyst is rapidly deactivated as a consequence of the consumption of dissolved hydrogen (L. Kh. Freidlin and N. I. Ziminova, *Chem. Abs.*, 10 May, 1951, **45**, 3698; from *Doklady Akad. Nauk, S.S.S.R.*, 1951, **76**, 551-4).

Styrene Formation

According to other Russian experiments, styrene is formed by the condensation of acetylene with benzene in the presence of aluminium chloride when the latter contains ferric chloride. Conversions are reported as low, but 15 per cent of the monomer in the products was obtained. The main product consisted of diphenyl ethane (I. P. Tsukervanik, *Chem. Abs.*, 10 June, 1951, **45**, 4666; *Doklady Akad. Nauk, S.S.S.R.*, 1950, **74**, 959-61).

Various modifications to the Kjeldahl nitrogen determination have been made during the period under review. To obviate error in the titration of unreacted heterocyclic bases, e.g., pyridine, the use of an indicator changing at pH 7-7.3, such as phenol red, has been recommended by French workers (J. Ploquin, *Comp. Rend.*, 1950, **231**, 1066-8). For the micro-determination of heterocyclic nitrogen, a method involving digestion with sulphuric acid and mercuric oxide in heavy-walled, sealed Carius tubes at 470°C. would appear to be promising. Advantages claimed for this method are high precision and accuracy, and a considerable saving in time (L. M. White and M. C. Long, *Anal. Chem.*, February, 1951, **23**, 363-5). To reduce the time between successive steam distillations a modified Parnas-Wagner micro-still is proposed (D. L. Shepard and M. B. Jacobs, *J. Am. Pharm. Assoc.*, 1951, **40**, 154-5).

Total sulphur content in petroleum oils

has been determined within ± 0.02 per cent by an X-ray absorption method, it is reported, in which the sample is compared in the X-ray beam with a standard polystyrene rod of the nearest effective density. Analysis may be accomplished in 10-15 minutes (S. W. Levine and A. H. Okamoto, *J. Amer. Pharm. Ass.*, May, 1951, **23**, 699-704).

Accurate Titration

A simple and rapid method for accurate titration of many organic compounds as acids has also been described. The sample is dissolved in a suitable organic solvent and titrated with 0.1 N sodium methoxide in benzene-methanol, using thymol blue indicator. Coloured or weakly acidic compounds such as phenol are determined potentiometrically in butylamine using a pH meter with antimony and glass electrodes (J. S. Fritz and N. M. Lisicki, *J. Amer. Pharm. Ass.*, April, 1951, **23**, 589-91).

Errors in the determination of organic peroxides by reaction with ferrous iron are claimed to have been eliminated by the use of acetone as solvent in the absence of air. Unreacted ferrous iron is determined by amperometric titration with dichromate, or the ferric iron formed is determined colorimetrically with thiocyanate. The method is recommended for control work where the higher accuracy of the iodometric method is not required (I. M. Kolthoff and A. I. Medalia, *Anal. Chem.*, April, 1951, **23**, 595-603).

Problems of Fatigue

FATIGUE—its manifold causes and effects—will be discussed by experts from Britain, the Commonwealth, Scandinavia, and the U.S.A., at a symposium organised by the Ergonomics Research Society to be held from 24-27 March at the College of Aeronautics, Cranfield, Bletchley, Bedfordshire.

The long list of papers covers such widely varying aspects of the subject as:—psychological criteria; fatigue and cold on the Korea battle front; tropical fatigue; age, health, and work; satiation and frustration as determinants; psychological aspects of visual fatigue; physical background; the psychologist's problem in measuring fatigue; and discussion on fatigue allowance.

Details of arrangements, transport and accommodation may be obtained from: S. H. Mound, 71 Princes Square, London, W.2.

Second George Douglas Lecture Read

Dr. Rowland Hill Speaks on Synthetic Fibres

THE Second George Douglas Lecture was presented by Rowland Hill, Ph.D., at a meeting of The Society of Dyers and Colourists at the Midland Hotel, Manchester, on Friday, 7 March. His subject was 'Synthetic Fibres in Prospect and Retrospect'.

The progressive industrialisation of the world to-day called for specialisation in fibres as it had already done in metals and other materials, said Dr. Hill. There was a natural limitation to what could be successfully accomplished with natural fibres and rayons. The future of synthetic fibres hinged upon this simple fact; success would come to those fibres which showed the greatest measure of useful distinctiveness at an economic level. It would depend, too, upon the skill and ingenuity of textile manufacturers in designing and processing finished goods which best utilised their unique qualities.

Annual World Production

The present annual world production of all textile fibres was about 20,000 million lb., increasing at the rate of 3 per cent per annum. Of this total, the rayons contributed 14 per cent, and the synthetic fibres, mainly nylon at the moment, about 1 per cent. It was sheer speculation to attempt to forecast how far and how big synthetic fibres would grow, but the high plant investment costs, and availability of raw materials, would become increasingly important factors. Where natural fibres or rayons were displaced, the displaced fibres would then become available to meet the expanding demand of the increased population and the higher standards of living arising from the world's material progress.

In constructing fibres from natural polymers, one was limited by the structure of cellulose itself, and the necessity for preserving the essential structural features in any chemical treatment or modification: with synthetic fibres, the problems were of availability, and potential cost of the desired chemical intermediates; of synthesising the desired polymer structure by a process free from disturbing side reactions; and then of converting the polymer into a textile fibre.

The combined efforts of very many

scientists spread across the past 25 years had led to five classes of fibres, these being respectively polyamides (nylon, 'Perlon'); polyesters ('Terylene'); polyacrylonitrile ('Orlon', 'Acrilan'); polyvinyl chloride; and polyvinylidene chloride. Minor modifications to these structures for specific purposes might be anticipated, but the birth of a structurally new fibre of merit and distinction was rare, and was becoming increasingly less likely. The relationship between polymer structure and primary properties such as melting point, crystallinity, and orientation was now well founded, but it was not yet possible to forecast, in useful detail, fibre properties from structure.

Dr. Hill said that discovery might result from the inspired work of several individuals, but development and commercialisation demanded large sums of money and a great many different kinds of technical skill. There had been two broad types of discovery and development in synthetic fibres. Firstly, the utilisation of polymer intermediates developed for non-fibre uses (e.g., vinyl and vinylidene chlorides originally produced for plastics, and acrylonitrile for synthetic rubber); and secondly, the production of rare chemical intermediates because they provided fibres of desirable properties (e.g., adipic acid, terephthalic acid, and caprolactam).

Synthetic Fibre Characteristics

As a class, synthetic fibres were characterised by high strength, low moisture absorption, and chemical inertness. The strong point of nylon lay in its outstandingly good abrasion-resistance; 'Orlon' was distinguished by superlative light- and weather-resistance; and 'Terylene' polyester fibre by certain desirable wool-like characteristics in appropriate constructions.

Many unsuccessful attempts had been made to simulate wool-like elasticity in synthetic fibres by attempts to build up structures suggested by that of wool itself. The answer seemed to be emerging from an entirely unsuspected direction, since the chemical structures of wool and 'Terylene' were so dissimilar.

'Hanane'—A New Systemic Insecticide

Further Progress Made by Pest Control Ltd.

IT has become established practice for Pest Control Ltd., to hold an annual Press luncheon at which recent progress in the use of systemic insecticides is reported. Last year the managing director, Dr. W. E. Ripper, introduced 'Isopestox' [*bis*-(isopropylamino)-fluorophosphine oxide] and last week he discussed the use of 'Hanane' on cocoa in the Gold Coast. The luncheon was held on 5 March at the Dorchester Hotel, London, and was attended by representatives from important daily newspapers and periodicals as well as trade and technical journals.

The rate of increase in the world population threatened to outstrip the increase in food production (said Dr. Ripper) and this gave emphasis to the need to increase agricultural production by control of pest and weeds. The chemical control of pests and weeds required a minimum industrial effort; 1 lb. of DDT or 1 lb. of plant hormone weedkiller, for instance, could increase the yield of an acre by 30-50 per cent. To achieve the same increase by fertilisers the application of half a ton of material was necessary.

The most recent development in the chemical control of pests was the chemotherapy of plants and during the past three years this new method had become more widely accepted. It had brought about great yield increases and had already become a routine treatment in many crops.

Most Effective Use

Systemic insecticides had been found most effective in controlling aphids or red spiders on a wide range of crops. 'Pestox 3' had been followed by 'Isopestox' and, later, by 'Hanane' and several other chemicals.

Pest Control Ltd., he said, was the first firm in Britain to produce and apply systemic insecticides on a commercial scale and they were still leading in the research on methods of application.

Although 'Isopestox' was far less lethal than similar compounds it was not harmless and considerable thought had been given to the development of a really safe method of application. It had been found that a dose of the systemic could be encased into a sub-

stance which would decompose when inserted into the ground. Capsules had been tried out and they were satisfied that this method of application was as effective as the application of liquid systemic insecticides to the root. The capsules could be safely handled and they avoided all the risks which were involved in direct application. The nurseryman could treat his crops without danger to himself and tropical plants could be treated by trained native labour under expert supervision. Little spears had been developed which could be stuck in the ground, close to the root. This spear had attached to it a capsule containing 'Isopestox' which would decompose in the humidity of the earth and the insecticide was released and translocated in the plant through the root. This method avoided the necessity to use the cumbersome process of spraying, fumigating, fogging by aerosol, etc.

Control of Cocoa Disease

The same principle underlay the firm's recommendation for the control of the vector of the swollen shoot disease of cocoa, which is a tiny mealybug feeding on the cocoa trees.

It had been estimated that swollen shoot had already killed more than 50,000,000 out of about 500,000,000 bearing cocoa trees and was spreading rapidly. Unchecked it would almost certainly destroy the Gold Coast cocoa industry. Although no categorical statement could be made until the results of their field experiments became available, they regarded the work of their team as being so encouraging as to warrant the hope that the large-scale application of its researches would turn the tide in the fight against this disease.

The only proven way to halt swollen shoot was to destroy the trees which were infected and from which the disease was spread by the mealybugs, which fed on them and then moved to healthy trees. But this cutting out was beset with difficulties; the symptoms might not appear for six months or until it was itself a source of infection. The efficiency of the method could, however, be improved and the total number of

trees that would need to be cut out reduced, if cutting out could be combined with the use of an insecticide to prevent the mealybug itself from spreading the disease. Unfortunately, cocoa trees were planted haphazardly under the necessary shade of forest trees and it was undesirable to destroy the many beneficial insects, especially those that pollinated the cocoa and those that kept other pests under control. Scientists were thus challenged to find an insecticide which could be so applied to the trees to kill mealybugs alone.

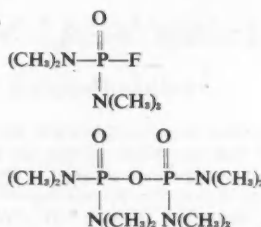
He had been sent out to the Gold Coast to recommend methods of chemical control and at first it was very difficult to see how one could effectively deal with this small insect (which fed on the branches of the cocoa tree) because it was protected by tree ants which built carton tents over them. Spraying would have been extremely difficult because the cocoa trees were not grown in rows and because it was necessary not to destroy the tiny pollinating gnats.

In the course of their research work it was found that mealybugs could be killed selectively without murdering beneficial insects but it was then necessary to choose carefully from their range of systemic compounds one that would be translocated in the cocoa tree and would be quantitatively decomposed so that not a single molecule reached the cocoa bean. Their success was the outcome of some prolonged and very fine biochemical work carried out by Dr. Heath and his colleagues in Dr. Hartley's research laboratories at Harston.

'Hanane' Quite Safe

Quite a few systemic insecticides which would kill mealybug were known but only one which was, to the last molecule, converted in the cocoa pod into innocuous compounds. This chemical Pest Control, Ltd., called 'Hanane' after Dr. Hanna, who led the firm's research team attached to the West African Cocoa Research Institute. It was a mixture of *bis*-(dimethyl-amino)-fluorophosphine oxide and *bis*-(dimethyl-amino)-phosphonous anhydride. The chemical formulae of these are given below.

'Hanane' had a mol. weight of 154 and was a colourless liquid with a faint odour. Its vapour pressure was 0.63 mm. at 25°C. It was miscible with water and most organic liquids. In the laboratory it was oxidised only by vigorous oxidising agents, but in



plants it was enzymatically oxidised to amino-phosphonic acid and finally to orthophosphate, the fluorine becoming detached during the oxidation and forming calcium fluoride. It could be quickly destroyed for decontamination purposes by free chlorine as could be produced by sprinkling bleaching powder.

Its volatility made its manufacture a dangerous process but in the field, as soon as it was applied, it was so much diluted with water from the soil and the plant that its vapour pressure was negligible.

Capsules containing 'Hanane' were inserted in the ground close to the stem of the tree and either through water which was poured on to them in dry periods or otherwise through the humidity of the soil, these decomposed within 24 hours and released the systemic. The 'Hanane' was absorbed into the tree and killed mealybugs for about six weeks, after which it was decomposed. The method of this decomposition had been carefully studied in Dr. Hartley's laboratory at Harston, using first the radio-tracer technique and later a chemical analysis method. It had been proved that every molecule of it had been decomposed and there was absolutely no residue.

As a result of these experiments the West African Cocoa Research Institute had recommended to the Gold Coast Government that a further series of experiments should be carried out on a field scale and it was hoped that this would commence shortly. A research contract had been let to Pest Control Ltd., by the Gold Coast Government. It would cover several square miles and to carry out this big experiment it was necessary to design a chemical plant and to build a factory. The Gold Coast Government had, therefore, let a further contract for an initial order of £500,000 of 'Hanane'. Although the building was not yet completed the plant was and production at the firm's works at Harston had started.

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Oil from Groundnut Kernels

Production of 'Ardil' Fibre Meal at Bromborough

A NEW continuous solvent extraction plant has recently come into operation at the oil mills of the British Extracting Co., Ltd., a Unilever undertaking at Bromborough. The site was originally allocated for oil extraction mills by the first Lord Leverhulme as long ago as 1912.

The new plant is designed to extract the oil from groundnut kernels by special methods which will allow the protein in the residual meal to be used for the production of the wool type fibre 'Ardil'. Approximately 80 per cent of the oil contained in the seed is first removed by crushing in expellers, and the extractor removes almost all the remaining oil, leaving about 0.5 per cent in the finished meal or 'Ardil' fibre meal.

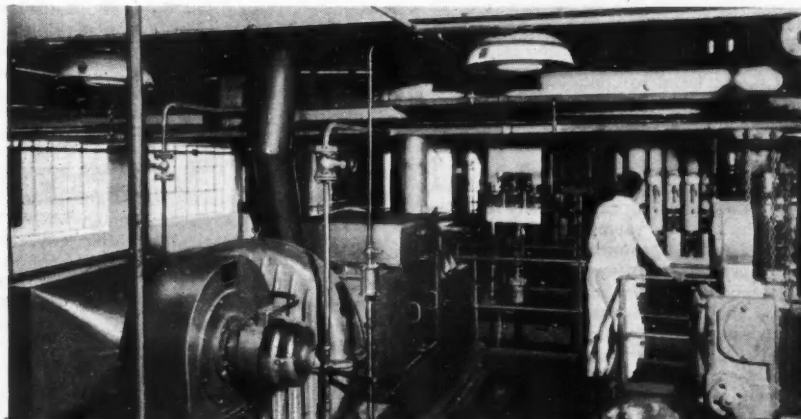
Solvent in the extraction process is reclaimed and can be used again indefinitely as the losses due to evaporation amount to less than one gallon per ton of seed processed. A Hansa-Muhle type extraction plant has been supplied by Messrs. Rose, Downs & Thompson, Ltd., of Hull, as well as the major part of the pre-treatment machinery.

Conversion of the extractable protein suitable for 'Ardil' fibre (about 40 per cent of the finished oil-free meal) is carried out in its Dumfries factory by a special process developed by Imperial Chemical Industries, Ltd. The residue is used in the production of balanced rations for livestock.

Although the design of the plant incorporates a number of features essential for the production of 'Ardil', it can at the same time be used to extract oil from a wide variety of oil-bearing seeds by normal methods. Capacity of the plant, nominally 100 tons per 24-hr. day, varies with the oil content of the seed under treatment.

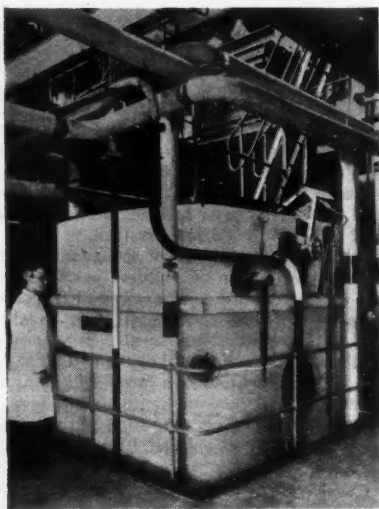
As in all processing industries, and particularly in oil milling, the preliminary treatment of the raw material is of great importance, and has a definite bearing on the quantity and quality of oil which can be extracted, and on the value of the residual meal.

After pre-treatment the main stream of cleaned and graded kernels is fed to steam-heated kettles where it is cooked before pressing in low-pressure oil expellers, and after reduction in breaker rolls is passed



[Courtesy, The British Extracting Co., Ltd., Bromborough

The low-pressure expeller installation in which the cooked meal is continuously and automatically compressed by pressure worms in three successive cages, and the oil expressed through perforations in the cage walls. In each cage it is subjected to a considerable decrease in volume which gives a corresponding increase in pressure



Courtesy, The British Extracting Co., Ltd., Bromborough

Top section of the extractor. The meal is received through an automatic feeder, and over a magnet to a variable capacity measuring chamber at the top of the extractor casing, and is admitted, through a sealing chamber, to buckets which move slowly down one side and up the other

through flaking rolls before reaching the extractor house.

It is not usual to continue oil extraction much below a figure of 1 per cent of oil left in the residue, although a figure of less than 0.5 per cent is being achieved in this plant.

In the normal continuous solvent extraction plant the solvent can be easily reclaimed from the meal by vaporisation. When producing 'Ardil' fibre meal, however, the rise in temperature must be curtailed, and the reclamation of the solvent requires particular care. The process is further complicated by the very fine composition of the dried material, and its tendency to cake and form a solid cement-like substance when in contact with moisture.

De-solventising at Bromborough is carried out under a partial vacuum and the unit consists of six horizontal tubes arranged one above the other. Each tube is steam-jacketed, and provision is made for the injection of open steam.

'Cat-Cracker' in Operation

STANLOW refinery (Cheshire) catalytic cracking unit is now in commercial production, turning out products at a rate of over 1,000,000 tons a year. Built at a cost, including auxiliaries, of £8,000,000, its completion marks the final stage in Shell's £30,000,000 post-war refinery expansion programme in the U.K., which, it is claimed, establishes Shell as the largest refinery operator in the country. The project included major extensions both at Stanlow and at Shell Haven in Essex.

Completion of the new unit is noteworthy not only because it will increase the supply of petrol but also because it marks another stage in the close integration of Shell's nearby chemical plant which will be able to increase its output of chemical solvents, such as acetone. Moreover, it will result in the recovery of about 10,000 tons per annum of valuable sulphur by providing the feed-stock for a sulphur recovery plant that is now nearing completion.

Ultimately, other by-products from the unit will serve as raw material for the production of tetraethyl lead by the Associated Ethyl Company at its new plant at Ellesmere Port, Cheshire.

The Stanlow 'cat-cracker' is Shell's second to come into operation in Western Europe. The first was at Rotterdam, which was also the first of its type to operate in this part of the world. A similar unit is to be erected at Berre-L'Etang, near Marseilles, in the South of France.

U.K. Glycerine Supplies

FURTHER reductions in the allocations of glycerine for March are announced in a letter from the United Kingdom Glycerine Producers' Association sent to most consumers. The deterioration in the supply position is said to be due to a reduction in glycerine production of the order of 20 per cent.

It is the association's intention to give priority to the restoration of full glycerine requirements for the allocation of export manufacturers as soon as supplies allow.

Glycerine, it is understood, can still be imported from soft currency areas on open general licence unless Mr. Butler has other ideas.

Chemical Research in Glasgow

Report of the Royal Technical College

A RECORD of the work in progress in its various departments, together with a list of the more important publications and the titles of these approved for higher degrees for the session 1950-51 has now been issued by the Royal Technical College, Glasgow. This replaces the *Journal* of the college, publication of which has now ceased.

Much interesting work was carried out in the Department of Chemistry.

The research programme in organic chemistry covered a wide field embracing alkaloids, steroids, triterpenoids, antibiotics and fats. The major effort was devoted to steroids, and work was proceeding on new methods for the part-synthesis of cortisone from compounds occurring in yeast. In the allied triterpenoid field, investigations concerning the structures of the naturally occurring α -amyrin, β -amyrin and ursolic acid were pursued.

A new alkaloid, related to brucine and isolated from *nux vomica* residues, was being investigated in an attempt to unravel its constitution and following the successful total synthesis of racemic deoxyaspergillic acid in the department, work was continuing on methods for extending the synthesis to aspergillic acid.

In the inorganic laboratories work continued on a scheme for the detection of anions precipitated by barium chloride, using a semi-microchemical technique. Investigations were also proceeding on the oxidation potentials of dyestuffs derived from *p*-phenylene-diamine, and on the application of paper chromatography to the detection of the inorganic constituents of gelatine.

Research in the physical chemistry laboratories involved a study of the photochemical oxidation of water in the presence of ferric ions, the physico-chemical properties of aqueous solutions containing phenols and long-chain detergents, the anodic oxidation of certain metals and the catalytic properties of the metal oxides, and the development of polarographic methods for the determination of unsaturation in fats.

Technical Investigations

Activities of the Technical Chemistry Department, though wide in scope, were in

the main complementary and contributory to the three fields summarised below.

1. The preparation, fundamental properties, and processing (e.g., dyeing) of polymeric substances.—Studies on dyestuffs, a long-standing section of the departmental work, and studies on polymer chemistry, a more recent innovation, clearly overlapped at many points, notably in the field of natural and synthetic textile fibres, and such studies were gradually being integrated into a single broad programme.

In particular, the photochemistry of azo-dyes was being investigated by irradiation of suitable dyes containing long alkyl side-chains, while spread as monolayers on various aqueous substrates. Work had begun on the kinetics or hydrohalogenation of rubber latex, and on the stereochemistry of vinyl polyadditions; and, as a problem on the semi-technical scale, the drying of seaweed as a preliminary to the extraction of alginic acid was being investigated fundamentally.

Mass-Spectrometer

2. The thermal decomposition of organic materials.—Work in hand included a study of the pyrolysis of esters, polyesters, and related substances: and infra-red spectrometry was being applied to an analytical study of complex tar fractions derived from coal-carbonisation. A mass-spectrometer was under construction, with the aim of extending the programme to a more fundamental study of certain vapour-phase pyrolyses.

3. The physical chemistry of finely-divided minerals.—Work in this field was concentrated largely on the properties of noxious industrial dusts, more particularly those believed to be responsible for pneumoconiosis. Important but incompletely understood physicochemical properties of siliceous dusts were being systematically investigated; some novel properties of the surface of finely-ground silica had already come to light, and a lengthy programme in co-operation with other workers in the same field had been initiated.

Air Pollution Abatement

Progress of American Manual

IN order to have easily accessible under one cover the wide range of information now available on air pollution abatement, the Manufacturing Chemists' Association, Washington, U.S.A., is accumulating a manual on the subject.

Outstanding authorities both within and outside the chemical industries have contributed to the series of pamphlets dealing with separate phases of air pollution abatement as related to the chemical and allied products industries.

A loose-leaf index style has been deliberately chosen for the manual in order to facilitate amendments or additions as new data become available.

By publishing the chapters serially as they have been finished the association has found that some confusion appears to have arisen.

Three new chapters—Legislative Requirements (4), Sampling Procedures and Measurements (6), and the Bibliography (12) are scheduled for publication next month at prices to be announced later.

Nearly Half Completed

Five of the projected 12 chapters have appeared to date. They are: Chapter 1 (Manual Sheet P-2), Introduction, July 1951, 25 cents; Chapter 3 (Manual Sheet P-4), Community Relations, July 1951, 25 cents; Chapter 9 (Manual Sheet P-10), Dust and Mist Collection, November 1951, 60 cents; Chapter 7 (Manual Sheet P-8), Analytical Methods, December 1951, 35 cents; and Chapter 5 (Manual Sheet P-6), Physiological Effects, December 1951, 60 cents. Manual P-1, Preface and Outline, is now available at 15 cents.

The most recent publication, Chapter 5, includes a listing of maximum allowable concentrations in the atmosphere for 144 different chemical substances. The author, Dr. E. M. Adams of The Dow Chemical Company, states that these have been effective in preventing harmful exposures of workmen within the plant, but should not be applied to general air pollution problems except when the duration and frequency of exposures are appropriate.

Other MCA publications include manuals on container handling and unloading, and safety data sheets relating to the properties,

handling and health hazards of individual chemicals. A price list will be sent on request. Remittance should accompany any orders addressed to Manufacturing Chemists' Association, Inc., Woodward Building 15th and H Streets, Washington 5, D.C.

'Bisol' Price Changes

THE following changes in the price of certain 'Bisol' solvents and plasticisers took effect on 3 March, 1952.

	Change	Ton	New Price
<i>n</i> -Butyl alcohol	Decrease	£45	£206
<i>n</i> -Butyl acetate	"	£40	£224
Isopropyl acetate	"	£10	£149
		Lb.	
Dimethyl phthalate	Increase	1½d.	2s. 2d.
Diethyl phthalate	"	1d.	2s. 6½d.
Dibutyl phthalate	Decrease	1½d.	2s. 8½d.
D.O.P. type phthalates:		Lb.	Lb.
Bisoflex 791	Increase	¼d.	2s. 10½d.
Bisoflex 81	"	¼d.	3s. 2½d.
Bisoflex 82	"	¼d.	3s. 0½d.
Bisoflex 91	"	¼d.	2s. 10½d.

In consequence of the reduction in the price of *n*-butyl alcohol, the following prices were reduced with effect from 4 March:

	Change	Ton	New Price
<i>n</i> -Butyl lactate	Decrease	£47	£498
<i>n</i> -Butyl laurate	"	£14	£381
<i>n</i> -Butyl oleate	"	£13	£328
<i>n</i> -Butyl stearate	"	£13	£366
Dibutyl ether	"	£55	£380
Dibutyl oxalate	"	£35	£432
Dibutyl tartrate	"	£32	£493
Tributyl citrate	"	£30	£436

The following price changes took effect on 6 March:

	Change	Ton	New Price
Diacetin	Increase	£6	£397
Triacetin	"	£3 10s.	£370

All the above prices are for 1 ton lots, carriage paid, in packages returnable at seller's expense.

Effect of Copper Scarcity

A reduction of its activities due to the present shortage of imported copper was announced by the Metals Division of Imperial Chemical Industries, Ltd., on 29 February. As a temporary measure it had been decided to adopt a shorter working week. This would mainly affect the departments of its Birmingham works engaged in the production of wrought non-ferrous metals. The extent of the reduction was not expected to exceed 10 per cent.

Rehabilitation of Malaya

First Comprehensive Survey Since the War

MALAYA's importance as a permanent outlet for British exports is emphasised in the Overseas Economic Survey 'Malaya' (March, 1951) compiled by K. E. Mackenzie, United Kingdom Trade Commissioner in Malaya, and now published for the Board of Trade by Her Majesty's Stationery Office (6s. 6d. net).

Salient facts on the various aspects of Malayan economy are given in the survey which covers the period from 1939 until the end of 1950, during which no single work has been published which deals comprehensively with economic and commercial developments in Malaya considered as one territory.

Although intended primarily for firms of the United Kingdom interested in the export trade with Malaya, the scope of the report has been enlarged, especially on the statistical side, so as to provide an ample foundation on which the post-war series of these reports may rest.

Order adopted for the chapters has been arranged so as to give a logical development from the basic facts about the country and its population to information about their welfare, occupations, means of transport and communications, up to their wealth, trade, and plans for the future.

Remarkable Recovery

Malaya can be said to have staged a remarkable recovery from the ravages of the war and by 1951 there were few signs left of the destruction, although the economic setbacks, lack of housing, shortage of electrical power, high cost of living, and so on, were still evident.

The two main industries, rubber and tin, were, of course, given primary consideration in the rehabilitation scheme, being of importance not only to Malaya but as a means of earning foreign currencies for the whole sterling area.

Only about four per cent of its planted acreage was lost by the rubber industry during the Japanese occupation. This was mainly due to the lack of upkeep of young rubber, but also to the destruction of mature rubber to provide land for food crops. On the other hand losses of buildings and

machinery by direct destruction and by looting were heavy and widespread, particularly on European-owned estates.

A remarkable recovery has, however, been achieved by the industry, net exports of rubber by weight increasing by about 290,000 tons between 1946 and 1950.

Two Serious Problems

Two serious future problems confront the industry. First is that of over-production when the present boon has subsided, particularly when the newly planted areas of high-yielding stock come into production (five to seven years after planting). This may well have to be met by endeavouring to find what further applications can be discovered and developed for natural rubber.

Second is the serious competition from synthetic rubber. Considerable attention is being paid to methods of improving the quality of the natural product, including schemes for centralised processing to obtain uniformity.

Effect of the war on the tin mining industry was much more serious than on the rubber industry. From a survey of the damage, made in 1946, it was estimated that over \$75,000,000 (\$8.57=£1) would be required for rehabilitation. Loans of \$80,000,000 were approved, of which \$70,000,000 have already been drawn. Exports of tin rose from a value of \$284,200,000 in 1940 to \$473,600,000 in 1950. Price per ton which was £500 at the beginning of 1948 rose to an average of approximately £1,060 in December, 1950, mainly due to the accumulation of reserve stocks by the U.S.A.

There are large deposits of bauxite in Malaya, but production has not been resumed since the war. Deposits in Johore have recently been surveyed by British and Canadian interests.

In Singapore there are two firms producing industrial gases, including oxygen (liquid or gaseous), acetylene, nitrogen and carbon dioxide.

As would be expected many kinds of rubber goods are manufactured, but all the chemicals used are imported. Moulded goods and articles made from plastic sheets and rods are produced on a small scale by

a few firms. There is an important glass factory in Singapore associated with an Australian firm.

About 17,000 tons of soap were produced in Malaya in 1950; almost completely confined to the medium and poorer grades of washing soap. At the beginning of 1951 the industry was faced with a shortage of palm oil, caustic soda and coconut oil. A large factory was being built at Kuala Lumpur for Unilever and was expected to begin production in 1952.

There is one paint factory in Singapore and only one firm in Malaya making fertilisers.

Most of Malaya's important imports are supplied by the United Kingdom, which in 1950 was the chief supplier of formic acid for the rubber industry. The principal source of sulphuric acid was the Netherlands, with the U.K. next.

Other chemicals in the import trade were dyes (mainly from the U.K., Germany and France); ammonia (from the U.K. and the U.S.A.); alum. (from France, the U.K. and Germany); carbide (nearly all from the Union of South Africa); disinfectants, weed-killers, insecticides, etc. (mainly from the U.K.); soda and sodium compounds (U.K. and British countries in Africa); caustic soda (U.K.) and compressed gases (U.K. and U.S.A.).

Almost all Malaya's fertiliser requirements are now supplied by the United Kingdom, imports from Canada, Belgium, and Chile (which sent considerable quantities in 1948), being greatly reduced.

In plastic goods the bulk of the market (63 per cent) was supplied by the U.K. in 1950. Most of the remainder were American goods imported through Hong Kong.

A summary of Malayan trade in 1951 will shortly be published by HMSO as a supplement to this survey.

Keeping Industry Informed

'INFORMATION Services and Industry' will be the subject of a conference to be held in London on 18 March. The subject will be considered in its broadest sense and the conference should be of interest not only to the intelligence (or information) and research departments of a company but also to its secretarial, production and commercial sections.

Three papers will be delivered at the morning session. The first will be a general survey, 'Information and Industry', by Sir Alfred Egerton, F.R.S., head of the department of chemical engineering and applied chemistry, Imperial College of Science and Technology.

A discussion by Dr. J. H. Chesters (United Steel Companies, Ltd.), and Dr. J. Farquharson (Beecham Research Laboratories, Ltd.), on 'The Practical Value of an Information Service' will follow, and the session will be concluded by L. Wilson (director, Association of Special Libraries and Information Bureaux) speaking on 'Aslib's Service to Industry'. There will be an opportunity for questions and discussion at the end of each paper.

The afternoon will be devoted to visits to information departments companies in the London area covering a wide range of industries, so that delegates may have an opportunity of seeing how various information services operate in practice.

Venue of the conference, which is being organised by the Federation of British Industries Industrial Research Committee in collaboration with the Association of Special Libraries and Information Bureaux (Aslib), is Church House, Westminster.

OCCA Dinner Dance

THE Oil & Colour Chemists' Association has announced that the principal guest at its dinner dance to be held at the Savoy Hotel, London, on 19 March, will be Mr. H. V. Potter, vice-president of the Society of Chemical Industry. Dr. J. Hoekstra, the president of the FATIPEC, has also accepted an invitation to attend. The presidents of the National Paint Federation, the Society of British Paint Manufacturers and the Paint Manufacturers' and Allied Trades' Association will also be present.

The reception will be held at 7 p.m. and after dinner there will be a few very short speeches so that dancing to Sydney Jerome and his Orchestra may begin as soon as possible and continue until 1 a.m.

Applications for tickets (2½ guineas) should be made as soon as possible to the general secretary, Oil & Colour Chemists' Association, Memorial Hall, Farringdon Street, E.C.4.

Nuclear Research in the U.S.A.

Views of the Brookhaven Reactor

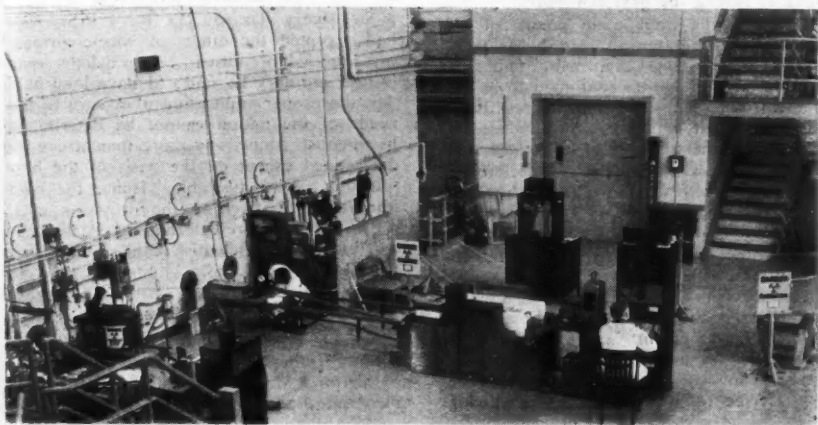
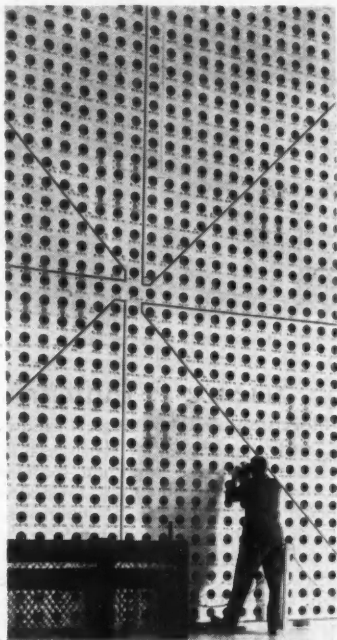
AN increased understanding of the nature of matter is made possible by the investigations being carried out at the research reactor, Brookhaven, U.S.A.

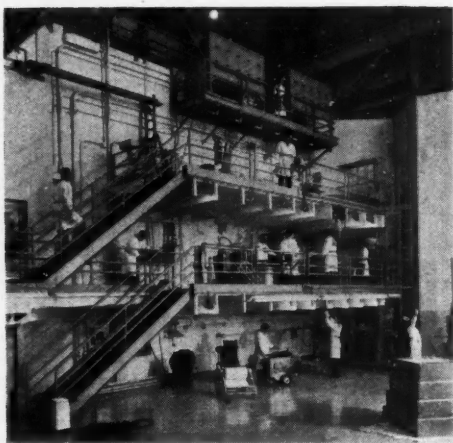
The holes in the face of the south wall (right) are eight inches apart and represent the arrangement of the uranium metal as it rests in the graphite moderator. The holes can also be used to insert other metals and substances for irradiation by neutrons. Some of these materials emerge with radioactivities of thousands of curies.

The technician is standing on an elevator which enables him to move to any level of charging holes. He is using a periscope to view the handling of these highly radioactive sources by remote control, with grappling tools and other equipment. A wall of heavy concrete five feet thick protects him from the radiation from the reactor.

Beams of neutrons emerge through ports in the face of the East wall (below), for

Charging holes in the shielding wall on the south face of the Brookhaven reactor (right). Through these holes tons of pure uranium metal must be loaded into the graphite moderator before uranium atoms can undergo fission. Below: View of the east face (white wall, left), showing some of the experimental equipment





studies of the properties of neutrons or of the materials they strike. Neutrons reflected by a mirror are then detected by a bank of counters inside the shielded array (centre). Neutron counts are recorded on the panel at right, which also supplies voltage for the counters.

In the background, behind shielding, is a slow neutron chopper.

View of the west face of the reactor (left), showing physicists and chemists on the first balcony carrying out experiments for measuring the energies of neutrons in beams emerging from the reactor. On the ground floor and second balcony are health physicists with equipment for monitoring the ports to ensure that the background radiation is kept below tolerance levels

Science & Industry

Indecision on Technological Education

NEEED for arriving at some definite conclusion on the important problem of technological education was stressed at the annual general meeting of the Parliamentary and Scientific Committee held in London on 6 February.

Sir Charles Goodeve, retiring vice-chairman, said that it was seven years since the committee started talking about technological education, and he hoped it would move twice as fast in the next few years.

Outlining the three main points of the committee's programme for 1952, Mr W. T. Wells, M.P., deputy-chairman, said that technological education continued to be one of them, but it must be remembered that it was a problem which raised fundamental issues about the structure of our educational system, outside the realm of technology itself. He agreed with Sir Charles, however, that it was important to try and reach some conclusion on the matter.

The other main points demanding the committee's attention were the shortage of science teachers and continuation of research into the possibilities and problems of Colonial Development.

Necessity for investigation of the application of knowledge in the industrial sphere, was referred to by Mr. Charles Orr-Ewing,

M.P., who said that Britain lagged behind in the manner in which she applied new inventions and new developments to her products. It would be well to examine what services were put at the disposition of our engineers in research and development and how this varied in the chemical, physical, electronic and other fields.

Mr. Austin Albu, M.P., supporting, said that he hoped the committee would devote a large part of its time to the application of science in industry.

Co-operation Necessary

Sir Henry Tizard, G.C.B., F.R.S., who had accepted the office of vice-chairman, was unavoidably absent, but in a letter read by the secretary he said: 'I have long held that the proper application of science to the needs of the nation cannot be determined by scientists alone, any more than it can be determined except on the basis of the best scientific advice available. Hence the high importance I attach to the provision of a forum where representatives of Parliament and independent scientists can educate each other.'

American Tour

MR. L. BAGRIT, managing director of Elliott Brothers (London), Ltd., left London by air on 7 March for a business journey to the United States.

Gas Research Agreement

Collaboration Scheme Announced

IMPORTANCE of a planned research is fully appreciated by the Gas Council and it is clear that the interests of the supply side of the industry and the manufacturers of plant and appliances are mutual and complementary.

Research of importance to the industry is, however, also carried out by the Society of British Gas Industries, which remains an association of firms in competition with one another. The most practical methods of obtaining effective collaboration have been discussed between the Gas Council and the council of the SBGI and an agreement on research policy has now been announced.

Under the scheme research will be organised under three main heads:—

(a) Work reserved respectively to the Gas Council and to individual member firms by the SBGI.

(b) Matters investigated by mutual arrangement between the Gas Council or the Area Boards and one or more individual firms.

(c) Investigations offering scope for collaboration between the Gas Council and the SBGI on a group basis.

Continuation of Practice

The first two provide, in effect, for the continuation of what has been the practice for many years, although the wider resources of the Gas Council and the Area Boards should offer a larger field of opportunity both for the supply industry itself and for individual firms working in collaboration with it.

To give effect to direct collaboration between the Gas Council and the SBGI under the final heading, the council of the SBGI will appoint from its research committee four to six members to form, with an equal number of gas Council representatives, a Joint Consultative Committee on Research. It is proposed that this joint committee, which will be a policy one, should not be tied by precise terms of reference but should be free to discuss any research matters that either party may suggest.

It is expected, however, that this joint committee will select subjects which show promise as fields for co-operation and that these will be remitted to research panels for study and to research teams for prosecution.

The Research Committee of the SBGI will secure the service on the panels and teams of appropriate persons from member firms and generally will act in a liaison capacity on research matters between the Gas Council on the one hand and its own Council and members on the other.

Cheaper Polystyrene

POLYSTYRENE has now become firmly established in the British plastics industry as a most useful and versatile moulding material. Development of its applications in this country has followed, to a large extent, the pattern of progress in the U.S.A., where last year over 220,000,000 lb. were used for moulded goods.

It has always been the intention of Monsanto Chemicals Ltd., that its 'Lustrex' polystyrene should be available to the moulder at a low price to stimulate his interest in finding new applications for it. Manufacturing efficiency and production costs are now at their best level and the company is therefore able to announce that as from 1 March the prices of 'Lustrex' per lb. in the U.K. will be 2s. 10d. for clear crystal and 3s. 1d. for colours, packed in 50 lb. five-ply paper bags, in a minimum quantity of 500 lb.

This is a substantial reduction which will bring the domestic market into line with those overseas, where for some time polystyrene has been available at a lower price.

No further reduction seems likely for some considerable time but it is hoped that the balance between supply and demand has now reached a stability desirable alike to both suppliers and user.

Informal Dinner

Owing to the cancellation of the dinner-dance of the Food, Agricultural and Microbiology Groups of the Society of Chemical Industry, it is proposed to give members an opportunity of meeting at an informal dinner to be held at Brown's Hotel, Albemarle Street, London, W.1, at 8 p.m. on Wednesday, 9 April, following the annual general meeting of the Food Group. Accommodation will be limited to 50. Members wishing to attend should apply to Dr. H. Egan, Government Laboratory, Clement's Inn Passage, Strand, W.C.2, before 5 April.

HOME

Coagulants Assays

A meeting of the Biological Methods Group of the Society of Public Analysts and other Analytical Chemists was held on Friday, 14 March, at 6.30 p.m. in the Room of the Chemical Society, Burlington House, Piccadilly, London, W.1. A paper, 'The Measurement of Prothrombin in the Control of Anticoagulant Therapy with Tromexan', was read by Rosemary Biggs and 'The Assay of Heparin, Protamine and Russel Viper Venom', by V. J. Birkinshaw and K. L. Smith.

Prices Reduced

Resulting from the reduced cost of butyl alcohol, A. Boake, Roberts & Co., Ltd., have reduced the selling prices of the following materials:—tri-butyl citrate now £436 per ton; butyl lactate now £498 per ton; butyl oleate now £328 per ton; butyl stearate now £366 per ton; di-butyl tartrate now £493 per ton. The prices are for 1-ton lots and operate from 3 March.

Analytical Chemists' Meeting

An ordinary meeting of the Society of Public Analysts and other Analytical Chemists will be held at 7 p.m. on Wednesday, 2 April 1952, in the Meeting Room of the Chemical Society, Burlington House, Piccadilly, London, W.1, it is announced. The following papers will be presented: 'The Determination of Traces of Arsenic in Germanium Dioxide and Tetrachloride,' by S. T. Payne; 'Inorganic Chromatography on Cellulose. Part IX. The Determination of Thorium by Chromatography on Alumina and Cellulose Adsorbents, and the Simultaneous Determination of Thorium and Uranium in Minerals and Ores,' by A. F. Williams, B.Sc., F.R.I.C.; 'Inorganic Chromatography on Cellulose. Part X. The Spectrographic Determination of Micro Quantities of Thorium Separated by Chromatography from Minerals and Ores,' by G. W. J. Kingsbury and R. B. F. Temple.

Prices Increased

It has been announced that the increased costs of raw materials have made it necessary for A. Boake, Roberts & Co., Ltd., to raise the selling prices, with effect from 6 March, of diacetin (now £397 per ton) and triacetin (now £371 per ton).

Magnesium Committee

A consultative and advisory body to be known as the Magnesium Advisory Committee has been formed by the principal companies in the U.K. magnesium industry, to encourage expansion in the production and application of magnesium and its alloys. Initial activities of the committee will be to hold regular discussions on general policy and technical matters as between member firms. It will also serve as the official liaison body for negotiations with Government departments. Mr. R. G. Wilkinson, deputy chief metallurgist of Magnesium Elektron, will act as honorary secretary.

Coryton Oil Refinery


A further stage towards the completion of the Vacuum Oil Company's new oil refinery at Coryton was completed on 6 March when a caisson of reinforced concrete, the main section of the water-intake jetty, was sunk alongside the refinery. This structure, weighing 4,200 tons, will house the pumping machinery for the cooling water both for the power station and the process plant. Already some of the main processing units are beginning to take shape and the refinery is expected to be completed early in 1953.

1951 Export Achievements

The export drive by the British pharmaceutical industry has achieved the remarkable increase of nearly 50 per cent over 1950, as evidenced by the following figures:—

Total U.K. Exports of Drugs, Medicines and Medicinal Preparations		
	£	
1938	3,280,977	
1949	18,366,503	Percentage increase on previous year's figures. 16.64 per cent.
1950	22,324,960	Percentage increase on previous year's figures. 21.55 per cent.
1951	32,965,681	Percentage increase on previous year's figures. 47.66 per cent.

Despite the exacting demands of the National Health Service, the industry's exports have been stepped up to a figure of approximately 40 per cent of its total production.



The Chemist's Bookshelf

IDENTIFICATION OF TEXTILE MATERIALS. 3rd Edition. The Textile Institute, Manchester, 1951. Pp. 94. 10s. 6d.

In their recent publication 'Identification of Textile Materials,' The Textile Institute presents a miscellany of information which is occasionally inaccurate, has some surprising omissions, contains a veritable jungle of tables, and is often badly edited.

Despite the large part played in fibre identification by chemical tests, some parts of the book betray an odd unfamiliarity with the day-to-day nomenclature of chemistry. Surely no chemist would have written 'dimethylol' (p. 17) or have written 'N. decane,' (p. 56) presumably for *n*-decane. It is more than a little disconcerting to find such contradictory statements as the following: 'At present only calcium alginate fibre is commercially available. It is non-inflammable on account of its high metal content . . .' (p. 20), and calcium alginate fibre 'bursts suddenly into flame. Chars. White residue incandescent in burner.' (p. 51).

The 'List of Trade Names of British and Foreign Rayon Manufacturers' (pp. 93, 94) which in such a publication might reasonably have been expected to be complete and authoritative, is neither. For example, 'Fortisan' is described as 'Cellulose acetate high tenacity yarn, continuous filament' whereas in truth it is a regenerated cellulose. 'Terylene' which is one of the most important of modern fibres is inexplicably missing from the table, and so is 'Dynel,' another very well-known fibre. Neither do 'Rhovyl,' 'Fibravyl' nor 'Fortinase' earn a place, although all three of them are mentioned in the text.

Some 34 pages of this book are devoted to reproductions of photo-micrographs and many of these which have been contributed by some (but not all) of our leading manufacturers are very beautiful. But even here there has been an injudicious and misleading selection. The cellulose acetate cross-section (Fig. 41) shows two filaments fused together, a most misleading and atypical picture; one

would have to examine a good many cross-sections of the best makes of cellulose acetate to find another case of filament fusion.

In the tables, which constitute a main part of the book and are evidently intended to be used in the same way as chemical analytical tables, some of those distinctions which really do puzzle the fibre analyst are quite glossed over. Thus on p. 33 the two methods given of distinguishing wool from chlorinated wool are:

(1) that the scales of chlorinated wool are 'not so obvious.'

(2) a difference in depth of colour on staining with Sherlastain A.

The first of these is quite unreliable, for well chlorinated wool has a scale system which under the optical microscope is often indistinguishable from that of untreated wool. The second depends on the distinction between a 'copper-brown' coloration and one of 'dark brown to black.'

The directional frictional effect of wool is carelessly referred to (p. 5) as the 'differential friction effect.'

The statement on p. 18 that cellulose triacetate is insoluble in 80 per cent acetone is misleading, inasmuch as this fibre is insoluble even in 100 per cent acetone. Other statements are so indefinite that they have little meaning; thus 'the cellulose of acetate fibres is fairly highly degraded, compared with that of regenerated cellulose.' If representative figures for the degree of polymerisation had been given it would have been seen that the difference is small.

The arrangement of the subject matter of the book has been needlessly complicated by the provision for identification of fibres without a microscope. In point of fact, a microscope is essential for fibre analysis. This has led to a good deal of reliance being placed on the density gradient tube which is still relatively uncommon and which requires an uncommon degree of skill to set up and operate, and which even under the best conditions is far less informative than the microscope.—R. W. MONCRIEFF.

OVERSEAS

Prosperity Evident

Evident prosperity of the potash industry in the United States was what struck him most forcibly during a visit to chief plants in that country, Dr. J. O. Sanderson, president of Western Potash Corporation Limited, reported on his return to Calgary, Alberta. Dr. Sanderson was accompanied by A. S. Dawson, geologist and field manager of the Canadian company which is developing a potash discovery at Unity, Sask. They visited potash firms operating in California, New Mexico and Utah to study brining methods.

To Use Brown Coal

A big Australian cement kiln, which will eventually make the State of Victoria independent of cement imports, is to be established in the east of the State and will be fuelled by brown coal lignite. Existing plants usually require long flame black coals which are produced in New South Wales, but black coal output is inadequate. The brown coal process already successfully used in Europe, is based upon the use of a vertical kiln which is cheaper and quicker to install than the usual type of rotary kiln.

Draft Specification

The Heavy Chemicals (Organic) Sectional Committee of the Indian Standards Institution recently formulated the 'Draft Indian Standard Specification for Ether (a) Technical, (b) Solvent and (c) Anaesthetic.' It has been widely circulated for review and comments to interested parties in India and abroad and will be finalised after 20 April, the last date for receipt of comments.

Canadian Oil

Crude oil production in Canada during 1951 rose by 74 per cent, from 3,700,000 to 6,500,000 tons, accounting for 1.1 per cent of world production and for the first time exceeding coal production in value. A 30-fold increase in known reserves has been experienced since 1946 and the latest estimates increase the total to 1,700,000,000 barrels. Natural gas reserves are estimated to be 11,000,000 million cubic feet. No account is taken of the 30,000 square miles of Athabaska tar sands in these estimates.

Exploitation of Uranium

A new agreement has been reached with Britain and the U.S.A. covering the production and sale of uranium from South Africa's Rand. Production is expected to expand within the next three or four years into an industry involving several millions of pounds of capital investment from British and American sources. Plant for the installation of refineries will be paid for by loans from both countries. It is claimed that the new industry might make the Union one of the chief uranium-producers of the world.

Portuguese Plants Opened

In Portugal two new plants of the Uniao Fabril do Azoto at Alferrarede and Barreiro, costing a total of 200,000,000 escudos, have been officially opened. The plant in Alferrarede is designed to produce daily 34 tons of ammonia, and that in Barreiro 126 tons of sulphate of ammonia.

Commonwealth Conference Ends

At the conclusion of the conference of British Commonwealth scientists held in Melbourne, Dr. Ian Clunies Ross, chairman of the Commonwealth Scientific and Industrial Research Organisation, said that the principal purpose of the conference had been to discuss means of integrating scientific effort throughout the Commonwealth. He considered that one of the conference's most important achievements had been to show that there were no scientific frontiers between one part of the Commonwealth and another.

Vitamin C Production

Australia, which began the manufacture of synthetic vitamin C for wartime needs of troops in the Middle East, has recently stepped up production, and is exporting surplus stocks of sorbose, from which the vitamin is made, to Great Britain. Recent research has shown that vitamin C will lengthen the life of wine and improve its quality. Beer with the addition of vitamin C keeps longer and exports have been sent recently to New Zealand for use by the local brewing industry. Many Australian restaurants wash fruit and salads in vitamin C and the salads are said to retain their freshness and palatability.

PERSONAL

MR. GWYN BENSON, director of plant research for Shawinigan Chemicals, Ltd., since 1944, has been appointed its European technical representative, and is expected soon at the London headquarters early this month. The post of plant research director will be taken over by Mr. D. J. KENNEDY, a graduate of Dalhousie University, who has been with the company since 1930. A Londoner by birth, Mr. Benson graduated from Cambridge in biochemistry and went to Canada in 1926.

MR. F. A. PARKER has joined Emcer Products, Ltd., as manager of the produce department to replace Mr. J. R. L. STANTON who has been transferred to Kenya where he has joined the board of the firm's associated company in East Africa.

Vacuum Oil Co., Ltd., have appointed Mr. D. M. GLENDINNING, B.Sc., A.M.I.C.E., F.Inst.P., manager of their new refinery at Coryton, Essex. Mr. Glendinning has had wide experience in the oil industry dating from 1927 when he joined the Shell Group in their Suez refinery. Among the posts he has held are those of chief engineer and deputy refinery manager for Lobitos Oilfields; chief engineer for Anglo-Egyptian Oilfields and chief engineer for Fina Petroleum Products.

The board of Pest Control, Ltd., announce that for health reasons SIR GUY MARSHALL, F.R.S., has relinquished his chairmanship of the company.

Sir Guy, as founder and first director of the Imperial Institute of Entomology from 1913-1942 made a great contribution to entomology and rounded off his career by bringing the practical application of the results of entomological research right on to the farms. He had been chairman of the company since it was founded in 1939.

LORD BOYD-ORR, D.S.O., F.R.S., who has accepted the chairmanship in succession to Sir Guy Marshall, is known best for his work as Director-General, United Nations F.A.O. (Food & Agricultural Organisation). He has for some time been interested in the application of science for the control of plant pests and diseases as a valuable means of alleviating the world food shortage.

WILLIAM I. BURT, vice-president in charge of manufacturing, B. F. Goodrich Chemical Company of Cleveland, Ohio, has been elected chairman of the Manufacturing Chemists' Association's Air Pollution Abatement Committee, in succession to J. M. GILLET, of Victor Chemical Works, Chicago.

Awards in recognition of long-service were made on 5 March to employees of A. Boake, Roberts & Co., Ltd., London, by the chairman, Mr. E. J. BOAKE, aged 83, who has himself been with the company for 60 years.



Mr. Boake (left), is here seen congratulating Mr. A. E. BARTON (centre), who joined the firm in 1907, and Mr. E. A. BANYARD, who has been with the company since 1903, after the presentation of their gold watches.

Obituary

MR. PHILIP CROSBY POPE, secretary of The Institute of Fuel from 1927 until his retirement in 1946, died quite suddenly on 1 March. Mr. Pope was an honorary member of the Institute and after his retirement was retained for a term as adviser to the Council. Born in 1872, he was Director of Purchases for the Government Department of Explosives during the first world war, and when peace came, took up as one of his main interests the low-temperature carbonisation of coal. In 1925 he was chairman of the Council of the Institution of Fuel Economy Engineers.

Publications & Announcements

THE Chemical Division of Celanese Corporation of America announces publication of its new 1952 catalogue which consists of 40 pages and includes information on all products of the division including aldehydes, ketones, solvents, acids and glycols. It represents extensive revisions on previous editions and has been enlarged to include a number of new chemicals. There is considerable information on the use and applications of these compounds and an extensive listing of physical and chemical properties of many of the chemicals has been included. Celanese specifications are available, as well as shipping, handling and toxicological data.

* * *

TWO pamphlets issued by Air Control Installations, Ltd., of Ruislip, Middlesex, deal with their 'Airmat Dust Arrester' and their 'Multi-Duty Air Filter.' Both contain drawings and specifications of the machines they describe. The dust arrester, of special design, employs a unit type frame with removable pocket-like holders, which simplifies installation and conserves space, as well as allowing quick and easy replacement of the filter material, say the company. The air filter is a self-cleaning filter employing a continuous viscous-coated air curtain.

* * *

A NEW Remington Rand product recently announced is the Remflex Copier. This is a facsimile photo-copying machine incorporating the Remflex Direct-Copy process, by which duplicates of any existing documents such as incoming letters, reports, manuscripts in pen or pencil, printed material, and books can be made quickly, easily and inexpensively, in less than two minutes, say the company. The unit has been made for office use, and is designed so that the operator can work comfortably from a seat in front of it. Its size is 3 ft. 6 in. by 2 ft. An important feature is that the prints produced on this unit are suitable for making Dye-line copies without needing a special translucent paper. The paper used is very much less sensitive to light than ordinary photo document paper, and therefore can be handled in normal lighting conditions much more freely. No dark room, nor dark corner is required. The self-levelling compensating lid enables copies to be made from books 3 in. thick.

ROTARY vacuum filters for filtration of chemical slurries, effluents, coal slurries, paper pulp, sewage, and so on, are described in its latest booklet (publication 1269), by Davey, Paxman & Co., Ltd., of Colchester. Working of the Paxman rotary vacuum filter is ingeniously revealed by a series of sectional illustrations on transparent paper so that various parts are clearly seen when each page is turned, yet when laid on top of each other represent the whole machine. Copies of the booklet, together with other publications of the company giving details of size, design and construction of the filters may be obtained on request.

* * *

DEVELOPMENT schemes estimated to increase the chemical industry's productive capacity by about 70 per cent are outlined in an article 'Industry To-day' in *The Times Survey of the British Industries Fair, 1952*. Projects referred to include I.C.I.'s £22,000,000 venture at Wilton; the Cabot carbon black works at Ellesmere Port, and the Philblack factory near Bristol; Monsanto's plant for polystyrene, detergents, oil additives and other products at Newport and the two major plants for chemicals from petroleum at Stanlow and Partington. Chemistry's importance in co-operative research is emphasised in another article, while the development of the British Industries Fair, now the largest trade display of its kind in the world, is traced and particulars are given of the range of goods and services which will be seen at the 31st Fair to be held in London and Birmingham in the first two weeks of May.

* * *

SOLWAY Flowrators, Ltd., have published a catalogue on their fluid flow meters (No. 51 I.P.). These are variable area flow meters in several different designs to suit different purposes. They comprise a vertically mounted, tapered bore tube, within which the position assumed by a freely moving float determines the instantaneous rate of flow. Linear in scale and remarkably precise, they are available for the measurement of all liquids and gases. At present the flow meters are for pipelines of up to 2 in. nominal bore. The catalogue may be obtained from the company at Abbey Road, Park Royal, London, N.W.10.

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576,971 ; 582,345.
D.S.I.R. Patent 590,725.



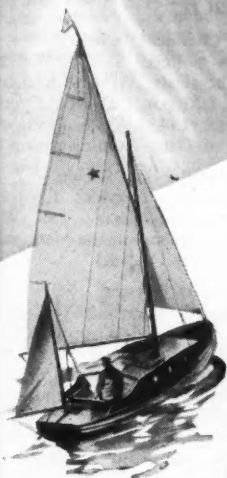
It was water, water everywhere—and very good to drink according to Mr. Stanley Smith and Mr. Charles Violet, pictured here on arrival in New York. Thanks to Permutit Sea Water Desalting Kits★ they were able to drink **directly treated sea water** throughout their Atlantic crossing in the 20ft. yawl "Nova Espero".

Sea water purification in emergency is only one of the many problems solved by Permutit ION EXCHANGE materials. With over 50 years' experience, the Permutit Research Laboratories have successfully tackled many difficulties in the treatment of water and other liquids for diverse industrial requirements. They are always ready to advise you on your problems, so please write to:—

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Next Week's Events

MONDAY 17 MARCH

Society of Chemical Industry

London: Burlington House, Piccadilly, W.1, 6.30 p.m. Special meeting at which selected papers recently published by the society will be presented in abstracts by the authors, followed by discussion.

Institute of Metal Finishing

London: Northampton Polytechnic, St. John Street, Clerkenwell, E.C.1. Dr. J. S. Jackson: 'The Problem of Hydrogen Diffusion in the Pickling of Spring Steel'.

Institute of Metals

Sheffield: University, St. George's Square, 7.30 p.m. Sheffield Local Section, annual general meeting, followed by joint meeting with the Sheffield Society of Engineers and Metallurgists. R. T. Rolfe: 'Bearings and Bearing Alloys'.

TUESDAY 18 MARCH

Royal Institute of Chemistry

Welwyn Garden City: The Cherry Tree, 8 p.m., with Welwyn Garden City Scientists' Club. L. E. Jones: 'Patents on Chemical Products'.

Royal Statistical Society

Bristol: University, 5.45 p.m. Study Section: G. F. Todd: 'The Assumption of Randomness in Applied Statistics'.

Institute of Petroleum

Manchester: Engineers' Club, Albert Square, 6.30 p.m. G. Noble: 'The Fawley Refinery'.

WEDNESDAY 19 MARCH

Royal Institute of Chemistry

London: Waldorf Hotel, Aldwych, W.C.2, 6.30 p.m. Dr. B. C. Saunders: 'Some Aspects of the Organic Chemistry of Phosphorus and Fluorine'.

Royal Statistical Society

London: London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 5.15 p.m. Research Section. R. L. Plackett and Dr. P. S. Hewlett: 'Quantal Responses to Mixtures of Poisons'.

Incorporated Plant Engineers

Bristol: Grand Hotel, 7.15 p.m. Western Branch, annual general meeting. F. H. Towler: 'Applications of Hydraulics'.

Textile Institute

Leek: Nicholson Institute, 8 p.m. Macclesfield, Leek and District Section. W. Penn (Courtaulds, Ltd.): 'Progress Report on the Dyeing and Finishing of Rayons'.

Institute of Fuel

Manchester: Engineers' Club, Albert Square, 6.30 p.m. Dr. G. E. Ritchie (director, Steam Engineering Department, BCURA): 'Research into Steam and Heat Utilisation in Industry'.

THURSDAY 20 MARCH

The Royal Society

London: Burlington House, Piccadilly, W.1, 4.15 p.m. Election of Fellows. I. Chester Jones: 'Disappearance of the X zone of the Mouse Adrenal Cortex during First Pregnancy'; G. E. Fogg: 'Production of Extracellular Nitrogenous Substances by a Blue-green Alga'.

Scientific Film Association

London: Institut Francais, Queensbury Place, S.W.7, 8 p.m. Programme of international scientific films presented by the International Committee of the Scientific Film Association.

FRIDAY 21 MARCH

Society of Chemical Industry

London: King's College, Strand, W.C.2, 7 p.m. Fine Chemicals Group, annual general meeting. 7.30 p.m. Dr. N. Evers (Allen & Hanburys, Ltd.): 'The Physico-Chemical Aspects of Drug Administration'.

Liverpool Metallurgical Society

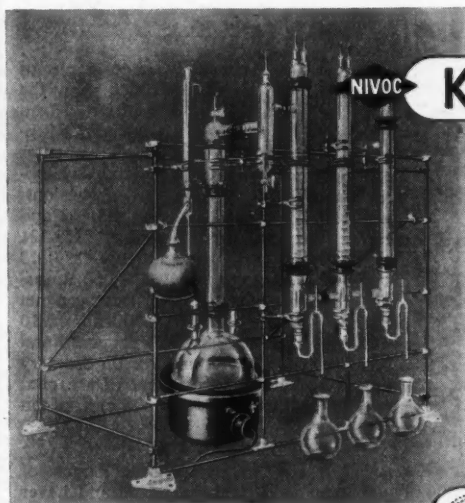
Liverpool: Electricity Services Centre, Whitechapel, Liverpool, 7 p.m. R. W. Ruddle: 'Recent Researches on the Mechanism of Solidification in Castings'.

Institute of Physics

London: 47 Belgrave Square, S.W.1, 6.30 p.m. Industrial Radiology Group. G. Weston and Dr. H. M. Glass (British Standards Institution) and W. E. Schall (Solus-Schall, Ltd.), discussion on 'Why Standardise?'.

Manchester: University, 7 p.m. Dr. B. Bleaney (Clarendon Laboratory, Oxford): 'Spectroscopy at Centimetre Wavelengths'.

(continued on page 426)



KEMIFRAME

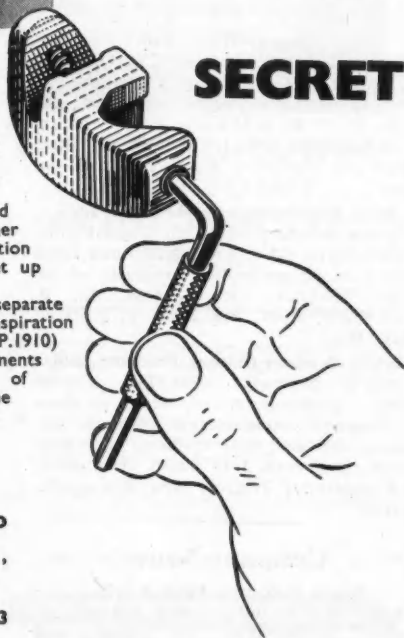
A continuous Distillation Unit and a Dean and Stark apparatus assembled on a "Kemiframe" floor unit 6' x 6' x 2' 6"

THIS IS ITS SECRET

Any rod or component can be removed from, or added to the framework at any time thus facilitating the extension of an experiment during its performance.

"Kemiframe" consists of a range of standard size rods which can be locked securely together with a special patented connector, and a wide selection of accessories enabling almost any chemical set up to be assembled.

All "Kemiframe" parts are available as separate components and every Chemist will find inspiration in the illustrated "Kemiframe" leaflet (P.1910) which gives details and prices of all components and accessories and includes illustrations of assembled frameworks. The economy of the system will appeal particularly to the organisers of research work in which apparatus requirements are continually changing.



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W75

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Increase of Capital

The following increase in capital has been announced: TAYLOR REESON LABORATORIES, LTD., from £1,000 to £2,000.

Satisfaction

VITAX, LTD. (formerly VITAX FERTILISERS, LTD., Burscough Bridge. (M.S., 15/3/52). Satisfaction, 11 February, of mortgages registered 15 November, 1946, and 13 August, 1947.

Receivership

P. L. Davies was appointed Receiver and Manager, Jefferies Chemical Co., Ltd., on 11 February, 1952.

New Registrations

Bremner-White, Ltd.

Private company. (505,128). Capital £1,000. Manufacturers of chemicals and chemical substances, liquids and gases, etc. Directors: T. R. S. Milburn, P. H. Milburn, R. A. Milburn, and E. M. White. Reg. office: 110 Sandyford Road, Newcastle-on-Tyne.

Moss Pharmaceuticals (London), Ltd.

Private company. (505,163). Capital £100. Manufacturers of and wholesale and retail dealers in pharmaceutical products of all kinds. Directors: Dr. L. Moss, Mrs. B. Moss and C. Moss. Reg. office: 61 Portland Place, W.1.

Shevels Brothers (Barium Products), Ltd.

Private company. (505,173). Capital £2,000. Manufacturers of barium products of all kinds, manufacturing, research, dispensing and analytical chemists, etc. Subscribers: J. Shevels, J. D. Smith. Reg. office: 20 Co-operative Terrace, New Brancepeth, Durham.

Company News

British Industrial Plastics, Ltd.

A statement by the chairman, Kenneth M. Chance, accompanies the report and accounts to be submitted at the annual general meeting of British Industrial Plastics, Ltd., to be held in London on 3 April. The opportunity has also been taken of

illustrating the statement by photographs of the factories of the Group which show the extensions that are being carried out. Consolidated profit for the year ended 30 September, 1951, after charging all expenses including £55,836 for research and development and £19,006 for provision of pensions, but before providing for depreciation and taxation, was £546,201. A sum of £129,131 was set aside for depreciation, £257,113 allowed for taxation, and £75,000 transferred to contingency reserve, leaving a net profit of £84,957. A final dividend of 10 per cent on ordinary shares is proposed and a bonus of $\frac{1}{4}$ d. a share, tax free on ordinary shares is also recommended out of a capital profit derived from the sale of part of an investment.

Unilever, Ltd.

The proposal to change the names of Lever Brothers & Unilever, Ltd., and Lever Brothers & Unilever N.V., to Unilever Ltd. and Unilever N.V. respectively, has now been approved by the members of the two companies and took effect on Monday, 3 March, 1952.

I.C.I. of Australia

Imperial Chemical Industries of Australia and New Zealand, a subsidiary of Imperial Chemical Industries, earned a profit of £1,460,709 in the year to 30 September, 1951, compared with £882,633 in 1949-50.

The ordinary dividend has been raised from $5\frac{1}{2}$ per cent to 7 per cent with a final distribution of $4\frac{1}{2}$ per cent. With the 5 per cent Preference charge, the dividend requirement is £634,497.

Next Week's Events

continued from page 424

SATURDAY 22 MARCH

Society of Chemical Industry

Joint works visit with Sheffield, South Yorkshire, and North Midlands Section, RIC, to the tar distillation plant, Orgreave Coke Ovens.

Scientific Film Association

London: Institut Francais, Queensbury Place, S.W.7, 8 p.m. Programme of international scientific films presented by the International Committee of the Scientific Film Association.

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Market Reports

LONDON.—A quiet trade has been reported for industrial chemicals during the past week with the present position unchanged and steady. The flow of routine deliveries against contracts is at about the recent scale, while new business with few exceptions is somewhat hesitant. The Lead Oxide Convention announce a revised list of extras for packages for lead oxides, dry and ground in oil, which apply to all deliveries on and after 10 March. There has been little change in the coal tar products market.

MANCHESTER.—Prices in one or two sections of the Manchester chemical market have displayed some easiness during the past week or so but otherwise the values remain firm. Home-trade users, with the outstanding exception of the textile and allied trades and a few other consuming outlets, are specifying for good deliveries of the soda compounds and other heavy chemicals due under contracts and a fair aggregate volume of replacement business has been reported during the past few days. Steady deliveries are being made on export account, though the restrictions on imports by the Australian Government are likely to have a serious effect on shipments to that market.

Phthalate Price Changes

Owing to an advance in the cost of phthalic anhydride, A. Boake, Roberts & Co., Ltd., announces that it has been found necessary to raise the selling prices of the following materials as follows (per lb):—

Di-ethyl phthalate 1d.; di-methyl phthalate 1½d.; di-ethylhexyl phthalate, di-nonyl phthalate, and phthalate 79, ¼d. each.

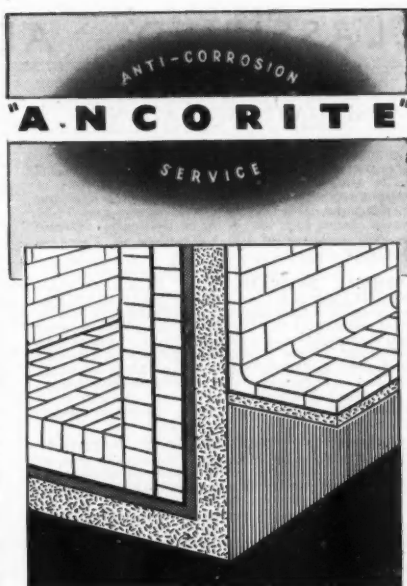
Although the price of phthalic anhydride has increased, the fall in the cost of butyl alcohol has made it possible to reduce the selling price of di-butyl phthalate by 1½d. per lb. There is no change in the selling price of di-amyl phthalate.

The new rates became effective as from Monday, 3 March.

ALTRINCHAM JUTE LTD.

Sacks and Bag Merchants and Manufacturers.
Buyers and Sellers of used jute sacks for
Home and Export for all purposes

25, VIADUCT ROAD, BROADHEATH, ALTRINCHAM,
CHESHIRE. Tel.: ALTRINCHAM 4360



A COMPREHENSIVE THREE-POINT ANTI-CORROSIVE SERVICE

WE

- ★ CONSTRUCT ACID, ALKALI AND OIL PROOF LININGS FOR TANKS AND INDUSTRIAL FLOORS
- ★ SUPPLY JOINTING MATERIALS TO WITHSTAND ANY COMBINATION OF CHEMICAL AND PHYSICAL CONDITIONS
- ★ ADVISE ON PROBLEMS AND RECOMMEND SPECIFICATIONS ON REQUEST

Please write for full particulars to:

CHEMICAL ENGINEERING DIVISION OF
THE GENERAL ASPHALTE CO. LTD

A THREE POINT ANTI-CORROSIVE SERVICE

HOPE HOUSE, GREAT PETER ST., LONDON, S.W.1

Telephone: ABBEY 3232 (7 lines)
Grams: GENASPHALT, SOUTHWEST

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

CHEMICAL ENGINEER. THE MIDLAND TAR DISTILLERS, LTD., OLDBURY, NEAR BIRMINGHAM, require a fully qualified Chemical Engineer with several years' experience in industry. An ability to apply sound knowledge and experience in the design and development of new chemical projects is of the first importance. Age 27-35. Good salary offered according to age and experience, etc. Contributory pensions scheme in operation. Applications, with full particulars, to PERSONNEL MANAGER.

EXPERIMENTAL OFFICERS AND ASSISTANT EXPERIMENTAL OFFICERS in various Government Departments. The Civil Service Commissioners invite applications for permanent appointments to be filled by competitive interview during 1952. A closing date for the receipt of applications earlier than December, 1952, may eventually be announced either for the competition as a whole or in one or more subjects. Interviews will be held shortly after the receipt of the completed application form and successful candidates may expect early appointments.

The posts are divided between following main groups and subjects: (a) Mathematical and Physical Sciences; (b) Chemistry and Metallurgy; (c) Biological Sciences; (d) Engineering subjects; and (e) Miscellaneous (including, e.g., Geology, Library and Technical Information Services).

AGE LIMITS: For Experimental Officers, at least 26 and under 31 on 31st December, 1952; for Assistant Experimental Officers at least 18 and under 28 on 31st December, 1952. Extension for regular service in H.M. Forces.

Candidates must have obtained, or be taking examinations during 1952 with a view to obtaining, the Higher School Certificate with mathematics or a science subject as a principal subject, or the General Certificate of Education in appropriate subjects, or the Higher National Certificate or other specified qualifications. Candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. Candidates over 20 will generally be expected to have higher qualifications.

Inclusive London salary scales:—

Experimental Officer: £628-£786 (men); £533-£655 (women).

Assistant Experimental Officers: £275-£586 (men); £275-£489 (women).

Somewhat lower rates in the provinces.

Further particulars and application forms from the **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1.** quoting No. 894-95/52. Completed application forms should be returned as soon as possible. 14941/100/EW.

MANCHESTER FIRM manufacturing chemicals and ancillary products and employing approximately 70 hands partly on continuous processes require **WORKS MANAGER** having knowledge of chemistry and engineering who must be a fully experienced organiser, knowledge of drying, heating, grinding, blending and screening advantageous. Salary from £600 upwards, plus bonus depending on ability, age and qualifications. Apply **BOX No. C.A. 3123, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.**

SITUATIONS VACANT

NORTH THAMES GAS BOARD. LABORATORY ASSISTANTS (MALE), preferably between the ages of 18 and 25, are required in the Laboratories at **POPLAR, E.14, NINE ELMS, S.W.2, BECKTON, E.8, and SOUTHAL, MIDD.**, to assist the Chemists engaged in the manufacture of gas and in development work.

Candidates should have matriculated or obtained exemption therefrom or hold Inter B.Sc. qualification. Starting salary range will be at the rate of £240 per annum, to £415 per annum, according to age and qualifications.

Applications, giving age and full particulars, should be addressed to the **STAFF CONTROLLER, NORTH THAMES GAS BOARD, 30, KENSINGTON CHURCH STREET, LONDON, W.8**, quoting reference No. 666/22

PROJECT ENGINEER (25-35) required for By-Product and General Chemical work. Salary £600 minimum. Pension Scheme. Canteen, etc. Apply **CHEMICAL ENGINEERING WILTONS LTD., c/o MINISTRY OF LABOUR & NATIONAL SERVICE, HORSHAM, SUSSEX.**

THORIUM LIMITED have a vacancy for a process control chemist at their Ilford works. Applicants should be B.Sc. or equivalent and should have experience of analysis and routine control, particularly in the inorganic field. The successful applicant will be required to develop and put into operation methods for routine process control and for the assay of final products. Salary will be in the range £450-£850 per annum and will depend upon qualifications and age. There is in existence a contributory pension fund. Applications should be made to **THE GENERAL MANAGER, THORIUM LIMITED, 10, PRINCES STREET, WESTMINSTER, LONDON, S.W.1.**

FOR SALE

A APPROXIMATELY 437 lb. **ALUM ACETOTARTRATE** in 27 earthenware jars, sealed. (Makers, Thomas Tyrer.)

Approximately 224 lb. **ALUM CHLORIDE CRYSTAL** in 4 earthenware jars.

5 cwts. **LACTIC ACID**, 30 per cent. edible, in 5 carboys.

Approximately 400 lb **ACETIC ACID**, 33 per cent.

Tech. Pure.

Any offers: Write or phone:

ST. ANDREW MILLS, LTD., LONDON, E.17

(Phone: LARKswod 1014.)

CHARCOAL, ANIMAL AND VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal-insulating; also lump ground and granulated; established 1830; contractors to H.M. Government.—**TROSBY HILL-JONES, LTD., "INVICTA" MILLS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL JONES, BOCHURCH, LONDON," TELEPHONE 3285 EAST.**

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600

TORRANCE Micro Twin Granite Roll **REFINING MILL**, 20 in. by 14 in. by 12 in. Oscillating adjustable back roll. Fast and loose pulley drive. Three Micro Twin **REFINING MILLS**, by Torrance. Rolls, 14 in. by 9 in. by 7 in. Drive from fast and loose pulleys.

Twin Steel Roll **REFINING MILL**, by Marchant, 24 in. by 12 in., driven from fast and loose pulleys.

Battery of six 20 in. diam. **CONE MILLS**, mounted on R.S.J's. Each **MILL** with jacketed hopper with 22 in. diam. mouth. Hand wheel adjustment to cones. Drive through gear-driven main shaft on sliding bevel give independent control to each mill.

ROTARY DRYER by Johnson, 40 ft. by 6 ft. diam. Motorised 24 h.p., 400/3/50, 950 r.p.m. With furnace steelwork and extraction fan.

Two Steam-jacketed **ROTARY VACUUM DRYERS**, each 17 ft. 3 in. by 4 ft. 6 in. diam. Manhole in barrel with cover. Mounted on roller tracks and driven through glanded trunnion bearings. Discharge through S.J. chamber.

GEORGE COHEN SONS & CO., LTD.,
SUNBEAM ROAD, LONDON, N.W.10,
Tel.: Elgar 7222 and
STANNINGLEY, MR. LEEDS.
Tel.: Pudsey 2241.

GRAVITY Roller Conveyor several lengths. Rolls, 2½ in. diam. by 16 in. 3 in. centres. Good condition.

THOMPSON & SON (MILLWALL), LIMITED, CUBA STREET, MILLWALL, E.14. (Tel.: East 1844.)

PHONE 98 STAINES

"**JOHNSON**" C.I. **FILTER PRESSES**, 32 plates, 31½ in. sq. centre feed.

Jacketed Vacuum/Pressure **AUTOCLOVE**, with aluminium inner pan and mixing gear, 8 in. diam. by 2 ft. 2 in. deep.

Electric **HYDROS**, 30 in. copper and stainless baskets, 400/3/50.

"**Werner**" Twin Fin Blade Jacketed **TIPPING MIXERS**, 3 ft. by 2 ft. 6 in. by 2 ft. 6 in., 29 in. by 27 in. by 19 in., and 24 in. by 25 in. by 19 in.

"**Weir**" and "**Serck**" Unused Brass Tube **CONDENSERS** up to 100 sq. ft. tube area.

HARRY H. GARDAN & CO., LTD.,
STAINES.

MONOCHLORONAPHTHALENE (REFINED GRADE) IN 5-GALLON GALVANISED DRUMS. IMMEDIATE DELIVERY OF UP TO 42 TONS MUCH BELOW MARKET PRICE. Apply BOX NO. C.A. 3117, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SCREENLESS PULVERIZERS for fine grinding of Chemicals. Also **CYCLONES**, **ROTARY VALVE FEEDERS**. Callow (Engrs.) Ltd. Kirby Trading Est., Liverpool.

TWO 35 ft. long by 9 ft. diam. Lead-lined **TANKS**. Stainless Steel **FILTER TANK**, 3 ft. 6 in. diam., and Jacketed **PAN**, 100 gallons.

Cast-iron **PIPES AND FITTINGS**, 290 tons.

VALVES in Stainless, Gunmetal, Enamel Lined.

Free Catalogue, "**WATKINS MACHINERY RECORD**," available.

FRED WATKINS, COLEFORD, GLOS.

FOR SALE

VARIOUS MIXERS FOR SALE

FOURTEEN various open-top **STORAGE TANKS**, riveted, capacities from 300 gallons to 9,800 allons. Last used for oil or varnish.

14. 2½ and 3½ size belt-driven **DISINTEGRATORS** by Christy & Norris or Harrison Carter.

Size No. 3 Junior Hammamac **HAMMER MILL** with fan and cyclone, also No. 1 size **Miracle GRINDING MILLS**

Robinson 3-sheet No. 1 size **CENTRIFUGAL DRESSING MACHINE** for dry powders, etc.

Four **ROTARY BOWL MIXERS**, 5 ft. diam., cast iron built, inclined agitators, by Baker Perkins.

Kek **GRINDING MILL**, square pin type, with grinding discs 13 in. diam., including circular delivery bin with single outlet.

Large unjacketed **WERNER MIXER**, belt and gear driven, hand tipping, double "Z" arms, pans 31 in. by 45 in. by 36 in. deep.

No. 200 One nearly new **WERNER PFLEIDERER JACKETED MIXER OR INCORPORATOR**. Low type, with C.I. built mixing chamber, 28 in. by 29 in. by 27 in. deep, with double "U"-shaped bottom which is jacketed, and double fish-tail or fan-type agitators geared together at one side, with belt-driven friction pulleys, 34 in. diam. by 5 in. face, with hand-wheel operation and hand-operated screw tilting gear. Machine fitted with machine-cut gears, covers, gear guard, cast-iron baseplate, and measuring overall approximately 7 ft. by 6 ft. by 4 ft. high to the top of the tipping screw.

No. 209 One **HORIZONTAL "U"-SHAPED MIXER**, steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

Two **FILTER PRESSES**, each fitted 68 wood recessed plates, 2 ft. 8 in. square, centre fed, with enclosed bottom corner delivery, cloth clips and belongings.

One **DEHNE FILTER PRESS**, cast iron built, fitted 45 recessed ribbed plates, 2 ft. 8 in. by 2 ft. 8 in. by 1½ in., with bottom corner feed, cloth clips and bottom corner separate outlets, angle lever closing gear, etc.

SIMON HORIZONTAL TUBULAR STEAM HEATED DRIER, barrel with steam-heated tubes, 12 ft. long by 5 ft. diameter.

Further details and prices upon application

Write **RICHARD SIZER LIMITED, ENGINEERS, CUBER WORKS HULL**

ZINC OXIDE, approximately 8 tons B.P. manufacture partly by Frickers Metal and partly by Felling Zinc Oxide; approximately 1 ton "Red Seal" Barking Zinc Oxide Mfg.; approximately 3 tons Jas. Brown manufacture. Replies to **BOX NO. C.A. 3124, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.**

FOR SALE

MORTON, SON & WARD LIMITED,
OFFER
the following

- ONE**—50 cu. ft. capacity M.S. Jacketed "U"-shaped **TROUGH MIXER**, with scroll type agitating gear arranged with motorised drive or fast and loose pulley.
- ONE**—new 24 cu ft. capacity "Morward" **TROUGH MIXER** with scroll type agitator, driven through reduction gear from direct coupled electric motor. Hand-wheel operated discharge door.
- "Morward" "U"-shaped **TROUGH MIXERS**, made in sizes 16 to 100 cu. ft.
- FOUR**—Stainless Steel **MOTORISED AGITATORS**, direct coupled to 5 h.p. geared motors, 2-in. stainless steel shafts, 3-bladed propellers, 180 r.p.m. As new.
- ONE**—Stainless Steel Motorised **AGITATOR** by **MITCHELL**, 1 h.p., with adjustable shaft and two adjustable 2-bladed propellers.
- TWO**—200-gallon, Open-top **STAINLESS STEEL TANKS**, 20's gauge.
- ONE**—200-gallon all c.i. **JACKETED BOILING PAN**, arranged with mixing gear, driven through bevel gears from fast and loose pulley; c.i. fume-tight cover. Mounted on three legs.
- A large selection of **VESSELS** in stock, which can be arranged with mixing gear and/or coil heating. Motorised or fast and loose pulley drive.
- Numerous all bronze brass tube **CONDENSERS** and **HEAT EXCHANGERS** available, from 20 to 70 sq. ft. surface area.

HYDRO EXTRACTORS

72-in., 60-in., 48-in. and 30-in. by **BROADBENT** and 42 in. by **WATSON LAIDLAW**, all electrically driven, 3-point suspension, complete with starting equipment.

MORTON, SON & WARD LIMITED,
WALK MILL,
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LANCS.

'Phone : Saddleworth 437.

- 1** Barron "D" **MIXER, TROUGH** 30 in. by 18 in. by 18 in. Vee-belt drive to 2 H.P. motor, 750 revs. 400/3/50. As new.
- One Werner Type **MIXER, TROUGH** 36 in. by 30 in. by 28 in. Twin "Z"-blades, power tilted, fast and loose pulley drive.
- THOMPSON & SON (MILLWALL) LIMITED,**
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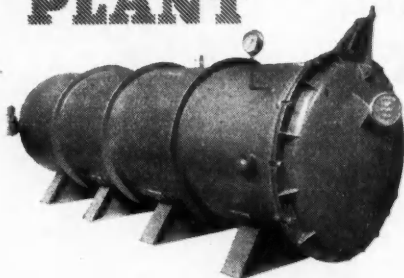
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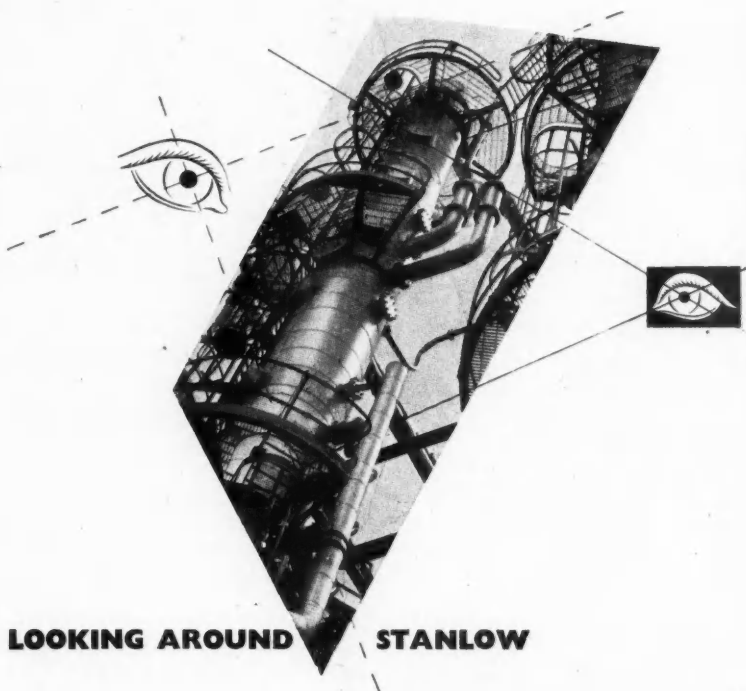
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